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Collective Review

AMERICAN RADIOLOGY—1905 TO 1955

PAUL C. SWENSON, M.D., Philadelphia, Pennsylvania

RADIOLOGY was 10 years old when SURGERY, GYNECOLOGY AND OBSTETRICS was born. During the first 10 years since the discovery of roentgen rays and radioactivity, much had been accomplished, but what was yet to develop would have challenged the most fertile and vivid imagination. Radiology is the youngest of all medical specialties unless perhaps one might think of oncology and geriatrics as being two recent additions to the list. In spite of its being 60 years old at the present time, it is still developing at a rapid pace. However, even in 1905 it had somehow come of age insofar as it was beginning to be recognized as a specialty 10 years after Röntgen had made his epoch-making discovery.

To the student of medical history, the development of the specialty of radiology has been about as romantic as any other. It is a saga of men of great vision, tenacity, and fortitude. It runs from martyrdom to the most erudite evolution and accomplishment in the physical sciences, from experimentation to the most exact physical fact finding. The public and even the medical profession have been led to believe that the Atomic Era began with the explosion of the first atomic bomb, yet we believe it better to think of the Atomic Era as being ushered in when Röntgen made his discovery in 1895, and when, a year later, Becquerel made his discovery of radioactivity.

It is a far cry indeed from the crude electrical apparatus that was first used to produce x-rays of rather low intensity to the modern apparatus that has been developed by the combined efforts of the physicists, electronic engineers, and physicians for both medicine and industry of today. The radiologists have kept pace by applying the new developments to the healing of the sick at the same time that avenues were being found for its application in industry and other scientific endeavors.

Through this period of 50 years we have seen the x-ray department move from a little dingy corner in the hospital basement to the elaborate, scientifically and intelligently planned departments that we see throughout the larger institutions and private offices of the present day. During this time we have seen a shift of emphasis from the former, which in the minds of some of even the better physicians held out little hope for amplification of the science of radiology, to the latter which eventually were responsible for the fruition of great vision and scientific endeavor—the development of a specialty which has been described as the very nucleus of diagnostic endeavor and in some areas the only hope in the sphere of treatment.

To anyone recording the development of the history of radiology, there are several different avenues of approach. One could make it a story

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of martyrs and men, men who were of great vision and scientific zeal and who saw the possibilities of application of the new modalities both to therapy and diagnosis; or one might make it a story of development of scientific apparatus alone, from the simplest of static coils to the modern giant high energy apparatus now used in medicine and industry; or one might make it a story of atomic physics which evolved from the time of Röntgen and Becquerel into our present knowledge of artificial radioactivity and atomic medicine. One might also separate it into epochs or periods. There were outstanding men of each period and the writer is aware of at least one pioneer who has outlived them all and is still actively engaged in the practice of radiology. I refer to the eminent "charter member" of the radiologic fraternity, George E. Pfahler of Philadelphia. It would seem expedient then to think roughly in terms of at least four, although not too sharply demarcated, periods.

The year 1905, as stated before, finds radiology in the midst of the period of enthusiastic discovery. Much had been accomplished before this time, but much was yet to evolve. In spite of the lapse of 10 years since Röntgen had described his invisible ray, the x-rays were still being produced by rather primitive methods. Static machines and old-fashioned induction coils were used to produce the high energies necessary, also the high frequency coil. There were many difficulties encountered with this sort of apparatus to be sure, for there was difficulty in controlling and measuring the output, and, moreover, high frequency coils required the use of a special type of tube. Actually, the most important milestone as far as apparatus was concerned took place, in the opinion of the writer, when the Snook interrupterless transformer was introduced in 1907 and along with it the cross arm and disc type of rectification. Later, in 1909, the autotransformer was introduced for better regulation of the energy output of the roentgen apparatus. The culmination of this particular era of enthusiastic discovery and development was perhaps the advent of the Coolidge tube, as well as the beginning of the use of films rather than glass plates for radiographic work.

Perhaps the greatest milestone in the development of radiology, irrespective of all others, was the development of the hot cathode filament tube by W. D. Coolidge in 1913. Now for the first time there was a controlled output from the x-ray tube. The old gas tube had been anything but accurate and was a problem to anyone who wanted to maintain any sort of precision and reproducible factors of exposure.

The glass photographic plate had been used as a means of recording the x-ray image until the impetus given to the use of films was brought about by the needs of the First World War. The demands of the Armed Forces for x-ray studies in their field hospitals and all hospital x-ray laboratories called for an unusual amount of x-ray plates, the supply of which could not be met satisfactorily at that time. Although the glass plates might be available, they were heavy and fragile and difficult to store, file, and transport. It was only natural that the development of good x-ray films should follow. At first they were made with a single emulsion and later on the need for greater speed and efficiency called for a double coated or duplitized film. At the same time, a good intensifying and fluoroscopic screen was developed which would further increase the efficiency of the x-ray apparatus. By 1925 a highly satisfactory film had been developed with good contrast and sensitivity, but all through the years the manufacturers have been successful in increasing the quality of both the emulsion and the film base as well as the luminescent materials of the intensifying and fluoroscopic screens.

Following a rather tragic fire in a midwestern clinic in the late twenties, the film base was changed from a nitrate to an acetate compound. Very noxious and lethal gases had been given off from the burning nitrate film.

The name of George Eastman was one of the figures most prominent in the development of the x-ray film industry; Carl V. S. Patterson was particularly prominent in the development of the modern intensifying screen and its present state of efficiency; and in the earlier years, Thomas Edison was also prominent in the developing of fluorescent materials. He was particularly interested in the development of the fluoroscope.

Following the War there was a slight lull in radiologic progress, probably as a result of the need for readjustment. The lessons learned from the War had to be reapplied to civilian medicine, so for a while things ran rather slowly. The First World War had had a profound impact on radiology. Not only was it necessary for special apparatus to be devised for field work, but this in turn produced an impetus toward later

development of better apparatus and better techniques. Schools of military roentgenology were established during the First World War which later gave many professional men to the specialty of radiology after the completion of the war, and it also put many lay men into the field of apparatus development and service. The foreign body localization both in the eye and elsewhere in the body required special apparatus which was of equal importance in civilian life.

A period which might be likened to the medieval Renaissance occurred around 1930 after the hot cathode tube patent ran out and thereafter competition in the field of manufacture became more effective. Tubes of higher capacity and finer focus were made. Rotating anode tubes, better cooling mechanisms for therapy tubes, and better means of electrical and radiation protection were developed. The use of electronic tube rectification rather than mechanical rectification followed, as well as shock proof apparatus. Everything was developed at a rather fast pace—supervoltage therapy, high capacity machines ranging recently as high as 60 mev, Van de Graaff machines, betatrons, and linear accelerators. In therapy, not only have the high energy x-rays been used but also the neutron beam and the beta radiation. Machines using the very lowest kilovoltage have also been developed for the production of x-rays for skin therapy. Soft radiation is given through so-called contact therapy apparatus, and tubes with a beryllium window are used for extremely soft radiation. Thus, highly perfected special therapy apparatus was put on the market with the manufacturers vying for honors in this field. Special diagnostic procedures such as tomography and kymography have also been developed, all with the purpose of increasing the diagnostic acuity of the x-ray film.

Then in 1945 the modern atomic age was ushered in and with the use of nuclear reactors for peace time purposes, radiology now finds itself in a still more specialized and strategic period reaching up to the present time and there is a hopeful feeling prevalent that the "surface has only been scratched" as far as the potentialities of the future are concerned.

The present position of radiology is that of one of the most important specialties in all of medical history. There is no related specialty in the medical sciences that does not lean heavily upon it for integrated help, but it took some time for a realization of its importance to develop. The large radiologic departments which now are found to occupy perhaps one or more floors of a large hospital building are well described as the cross roads of the hospital. Here all specialties meet on a common ground for consultation, help, and co-operation. However, since it was not always so, it is well to reflect on the small beginnings. There was a time, as we have already said, when the radiologic apparatus was relegated to one small corner of the basement storage room. The events which separate these two extremes have been a compilation of physical data, development and improvement of apparatus, and clinical research into the needs and further uses of diagnostic as well as therapeutic measures. Perhaps diagnosis was given the greatest impetus because there was a good deal of lore and imagination attached to its possibilities, whereas there was not quite the same glamor associated with the therapeutic aspect. It took some years before there was sufficient capacity in the various machines to give much of a penetrating dose and, indeed, after the initial knowledge that the x-rays could be harmful to patient and operator (as shown through the pioneering martyrs' injuries), there was a lag in its use. However, the physicist has gradually helped the clinician in controlling his dosage, protecting both the operator and the patient.

Early in the history of radiology the rays were tried therapeutically, for the most part for superficial conditions—skin malignancies and even some benign skin conditions. Later there was a wave of enthusiasm for treating conditions other than malignant ones that were deep-seated, but luckily for those of us who belong to the second generation of radiologists, it has been shown that all ionizing radiations are to be used for the most part on malignant conditions only and have little part in the attack on benign conditions except in certain carefully selected instances in which the application of treatment must be very carefully managed and controlled.

At the time we are beginning our story of radiology, Clyde Snook of Philadelphia had already improved the power source by developing the mechanical rectifier. This was later replaced by the valve tube rectifiers which have become almost universal now. Yet the mechanical rectifier stayed with us at least until the late twenties. Self-rectifying tubes were being used in the late twenties. Thereafter the "stunt" of im-

mersing the tubes in oil became almost a universal thing and very shortly thereafter shock-proof apparatus was the order of the day.

The Potter-Bucky diaphragm has been improved with the years as well. This is a very important bit of apparatus in the diagnostic field. Gustav Bucky originally was responsible for the stationary grid. Potter devised the moving grid. Later on, the names of Lysholm and others were associated with stationary grids which broadened the use of the principles of the Potter-Bucky diaphragm. Now we have improved efficiency through increased grid ratios and reciprocating action.

Each of the major world conflicts has contributed extensively in men, and in the advancement of apparatus and techniques. Christie, Manges, and Hickey are names of great importance of the First World War. Because of the large number of outstanding individuals working in the Second World War as far as radiology is concerned, it is difficult to cite particular individuals.

While American radiology has been developing with leaps and bounds European radiology has been doing so also. Our European confreres have been particularly active in developing apparatus, both for diagnosis and therapy. Their work with kymography and tomography is of outstanding merit. While America was concentrating in the late "teens" and "twenties" on the development of better roentgen apparatus, our European confreres were concentrating on the use of radioactive material. Madame Curie was still alive and was actively at work in her laboratory at the Curie Institute, which is still a mecca for the treatment of malignant disease.

At the same time our Scandinavian and English confreres were doing a big service to radiology. Forssell, in the development of the Radium Institute (Radium Hemmet) in Stockholm, perhaps did more for radiology than any other individual aside from Röntgen, Madame Curie, and Coolidge. The Cancer Institute which he developed, where patients were not only scientifically treated but well followed up is an outstanding spot for the study of malignant disease. Americans have done well to follow his pattern. There are now two such centers in Sweden; the other one is in Gothenberg, directed by Magnus Strandqvist. In England we had such eminent workers as Barclay, Windeyer, and Patterson developing both diagnosis and therapy. In Germany, the more modern era of radiology includes such names as Holthusen, Holdfelder, Haenisch, and Berg. In France, the name of Beclere was outstanding as a pioneer. At the Curie Institute the Curie-Joliots were discovering artificial radioactivity in 1934.

RADIATION PHYSICS

We owe a great debt of gratitude to our American physicists who have helped raise the standards of radiology. These include Compton, Urey, Fermi, Seaborg, Kerst, Glasser, Failla, Quimby, Lauriston S. Taylor, Lawrence, Aebersold, and many others. Lauriston Taylor, working at the Bureau of Standards in Washington, has kept the profession cognizant of all the details of protection of both personnel and patient. In no specialty has there been a closer liaison between the physicist, manufacturer, and clinical radiologist.

Space does not permit the enumeration of the names of European physicists but American radiology recognizes its debt to many of them as well. Radiology is obligated to these fine people who have worked in close co-operation with the clinical radiologist ever since the beginning of our specialty.

For a number of years the biologic unit of dosage was the only one that had been conceived. It is true that in 1896 Perrin had measured x-rays with an ionization chamber, but very little was done for a number of years in developing this physical unit based on ionization.

In 1901 Benoist introduced his penetrometer to measure radiation quality, and fluoroscopic dosage had been suggested the next year by Contremoulins. That same year Holzknecht presented a chromoradiometer for measuring x-ray dosage, and in 1904 Sabouraud and Noiré proposed their pastille radiometer.

In 1905 Kienboeck used silver bromide paper strips as a basis for measuring the dosage of radiation therapy.

In 1908 Villard first proposed a dosage unit based on ionization in air by x-rays.

In 1914 Duane of Harvard brought out a dosage unit based upon ionization which he called the "E."

It was not until 1928, however, that the official "roentgen" (r) was established as a unit of dosage intensity based on air ionization. This occurred at the Radiologic International Con-

gress in Stockholm. Up to that time the x-ray dosage had been for the most part determined by a skin unit dose, as brought out by Seitz and Wintz in 1920, and for the most part dosage was spoken of in terms of its effect on the skin as an erythema dose for varying field sizes and qualities of radiation. Since the establishment of the r as the official physical unit of x-ray intensity, the physicist has constantly improved our concept of tissue dose and tumor dose for all types of radiation insofar as possible. Refinements of method and application have been developed, leading to more accurate dosage and better protection of the operator and the patient.

THE TEACHING OF RADIOLOGY

By the middle twenties almost every medical school had a well organized Department of Radiology with separate teaching responsibilities. The pedagogic methods have been varied. Didactic lectures are difficult because teaching is for the most part visual and requires special effort to have the student see as well as hear about the radiologic methods. Teaching methods are improving because of an attempt to give so-called dry clinics and interdepartmental conferences with small groups under the so-called block system of teaching. Most men in top teaching positions will agree that the most important point to get across to the undergraduate is the limitations of the x-ray examination rather than to make radiologists of the student. In other words, the object should be to teach the student just where radiology can help him regardless of what specialty he goes into or whether he is to be a general practitioner. Whatever his particular endeavor will be in the practice of medicine, he must be aware of the hazards of this modality, both to himself and to the patient. This is another thing that is being stressed in the teaching at medical schools throughout the country.

The undergraduate cannot be, at any time, completely trained in techniques and/or the exact diagnostic criteria in every case, but he can be told of the limitations and how to protect himself. Along with the stressing of protection, the student should also be given some smattering of radiation physics so that he can better understand the problems of technique and protection.

Thereafter in the graduate teaching, the resident in radiology is usually given a program which covers all the various aspects of ionizing radiations, including curie therapy, roentgen therapy, the application of isotopes, and basic physics.

Since the establishment of The American Board of Radiology, American radiology can be proud of the type of man that it offers to the profession, and with the years this situation is improving. One of the reasons for the lull that occurred during the twenties is the fact that the teaching of radiology was just developing and many of the men who came out of the First World War with only a cursory training had still much to accomplish in adjusting themselves to civilian radiology. Many of them were to finish their training only through the rough school of experience rather than through any formal training.

This defect in teaching has now been taken care of so that when the Second World War called for experienced radiologists there were many more available, and the current problems were much more easily resolved. The Second World War found still greater need for improved apparatus than World War I. The interval between the two conflicts had seen a great deal of development in apparatus as well as in men. The most important contribution of the Second World War, however, was the advent of the modern Atomic Era as a means of furthering our military objectives through the Manhattan Project. The channeling of the benefits of the Atomic Pile into peacetime purposes was a great blessing that occurred from an otherwise disastrous struggle.

ORGANIZATIONS AND RADIOLOGIC LITERATURE

Even though credit for the first Roentgen Ray Journal must go to the British, who in 1896 published the *Archives of Clinical Skiagraphy*, American Radiology was early to realize the importance of organization and publication, and the Americans are justly proud of their record in this respect.

It was on March 26, 1900 that the Roentgen Society of the United States was organized in Saint Louis, and its first meeting was held in New York City at the Grand Central Palace late in that year. At this meeting, it became the American Roentgen Ray Society and the papers that were given there were published in the *American X-Ray Journal*.

Later, the American Roentgen Ray Society established the *American Quarterly of Roentgenology*

which later became the *American Journal of Roentgenology*.

With the establishment of The American Radium Society in 1916, the name of the journal was changed to the *American Journal of Roentgenology and Radium Therapy*, and it became the official organ of both societies.

Still later, when atomic medicine became an established branch of radiology, the name was changed further to embrace nuclear medicine, so that at the present time we are justly proud of the *American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, which is the official organ of The American Roentgen Ray Society and The American Radium Society. It is now in its seventy-third volume.

A review of the various editors of these publications and its consulting editorial board would perhaps be appropriate here, but space does not permit, and the writer would respectfully refer the reader to the information given in the current journals for the individuals now concerned with this publication. The former editors include such stalwarts as Preston M. Hickey, James T. Case, Harry M. Imboden, Arthur C. Christie, and Merrill C. Sosman; the present editor is Lawrence Reynolds.

In 1915 the Western Roentgen Society was organized. It later, in 1920, became the Radiological Society of North America. Its *Journal of Radiology*, now called *Radiology*, was established in 1920. This is another great credit to the radiologic fraternity. The editors of its journal have been Maximillian Hubeny, Leon J. Menville, and Howard P. Doub. *Radiology* represents the highest standards of quality in the field of medical publications. It is now in its sixty-fourth volume.

We previously have commented that radiology was beginning to become recognized as a separate specialty in the first decade of its existence. It became officially recognized as such in 1924 when the American Medical Association established a special section of Radiology.

The American Radiologic literature owes much to its "old world" sister publications from Germany, Britain, Scandinavia, and France, not only in exchange of information, but in precept and example.

From Germany we have the following Journals: *Fortschritte auf dem Gebiete der Roentgenstrahlen, Strahlentherapie, Roentgenpraxis, Wiener Gesellschaft für Roentgenkunde, Zentralblatt für die Gesamte Radiologie, and Zeitschrift für Roentgenologie.*

From Scandinavia comes the *Acta Radiologica* for which the famous Gösta Forssell was responsible as its brilliant editor for so many years.

In France the *Journal de Radiologie et D'Electrologie* has been published since 1914.

In Britain there is the *British Journal of Radiology*, first published under that name in 1924. This is probably the best known publication from England.

Time and space do not permit us to enumerate all the great names associated with these publications, for we are primarily concerned in this discussion with radiology in America.

The International Congress of Radiology was established after the First World War in 1925. Since then, seven congresses have been held with great benefit to the entire medical profession in good will and exchange of ideas for mutual educational value.

The Inter-American Congress of Radiology was established 12 years ago and has since had five very interesting and fruitful meetings, the last being in Washington, D. C. in 1955. It has done much to promote good will and understanding between our sister republics of Latin America.

Besides the section on Radiology of the American Medical Association, societies have been established in almost every state and in almost every large city.

The American College of Radiology was organized in 1923 and has been active ever since. The fellowship group includes the outstanding men of American Radiology who have contributed to American medicine through their own specialty. It also includes many associate members from foreign lands. The organization has done much to influence the status of radiology both professionally and economically throughout the country.

Much of the radiologic literature has been written in surgical journals, and, indeed, in SURGERY, GYNECOLOGY AND OBSTETRICS, for it is obvious that there is an overlap which is unavoidable. This overlap is very important to both surgery and radiology. As a matter of fact, as pointed out in another portion of this discussion, the surgeon has been helpful in showing the way in many roentgenologic problems dealing with opaque material for visualization and/or with diagnostic techniques. Radiology recognizes its debt to surgery in this regard.

Several textbooks dealing with radiology in general have been written by some of the older men as well as contemporary writers of today. At first, the foreign literature was richer than the American, but I think that recently the American literature has kept pace with that of Europe. Not only have general textbooks been written, but special monographs dealing with various phases of radiology have appeared, and we can point with pride to most of the current literature.

DIAGNOSTIC RADIOLOGY

The development of diagnostic radiology is a story of progressive appreciation of contrasting densities on the photographic film so that they can be interpreted in the terms of normal anatomy, or as changes indicating gross pathological conditions.

At first, the radiologist had only the natural contrasting densities to rely upon, i.e., the air-filled lungs outlining the mediastinum, heart, and diaphragm domes; the gas in the bowel outlining that structure; gas that might have escaped from the gastrointestinal tract or lungs into potential spaces or might have reached there by accidental means; gas within an abscess placed there by the aspirating needle or produced by gas-forming bacteria; the calcium content in the tissues, either normal or pathologic; and certain planes outlined by the less dense fat tissues.

It soon became apparent that if any progress was to be made in furthering diagnostic procedures, opaque materials would have to be used to bring out contrasting densities. The first of these was used by Walter Cannon when he gave a bismuth salt to a cat to outline its gastrointestinal tract. Ever since that time there has been a constant effort to improve and increase the number of these diagnostic opaque materials.

Soon after Cannon had given bismuth to the cat and Williams of Boston had a little later used it in the human being, barium sulfate was found to be the most satisfactory basic opaque material for use in the gastrointestinal tract. In its chemically pure form, it was found to be completely inert and, aside from its tendency to create obstructing scybala in the large bowel when indiscreetly given, produced no hazard whatsoever, except when perforation of the gastrointestinal tract was present.

In 1921, Graham, Cole, Copher, and Moore (4) came up with an epoch-making development of a diagnostic opaque material for use in the biliary tract. They were successful in attaching a halogen radical to a phenolphthalein compound which was known to be excreted through the biliary tract. Thereby, they obtained a concentration of the material in the gallbladder. Since this compound was first brought out by the Graham-Cole group, there have been many others developed. Currently used compounds under the name of telepaque, for oral administration, and biligrafin (Schering), for intravenous use, have been successful not only for visualization of the gallbladder itself, but also of the biliary duct system.

All of these newer compounds have been developed with an aim toward decreasing their toxicity and increasing their efficiency and ease of administration. The higher the halogen content, of course, the better the material is for the purpose in mind.

As far as the urinary tract is concerned, James Edwards, a Glasgow surgeon, had shown a renal calculus by roentgen examination as early as 1896, and early the next year Tuffier apparently used the first opaque ureteral catheter to show a renal calculus. In 1901 Schmidt and Kolischer had used a fused wire inserted into an opaque catheter. Three years later, in 1904, Klose used an emulsion of bismuth to outline the kidney pelvis and ureter, but the bismuth was difficult to get rid of and the entire examination was a bit unsatisfactory. However, it was the first attempt to visualize the kidney pelvis and ureter.

Eventually, after much experimentation, Völker and von Lichtenberg, in 1906, first used colloidal silver to outline the ureter and pelvis successfully. Later on in 1913, 20 per cent xeroform in oil was used by Döterlein and Krönig, and in 1915 Burns used a solution of thorium nitrate as the opaque material.

In 1918 Cameron, Graves, and Davidoff demonstrated the sodium iodide solution for pyelography. This was considered quite a standard procedure for some time until within the last decade some of the newer opaque materials that were used for intravenous work as well were also used for retrograde pyelography.

Iodized oil has been used for outlining the urethra and bladder. Gas in the form of oxygen or filtered air has also been used within the urinary tract.

Later, in 1929, Moses Swick (6) brought out excretion urography. Many variations of the original halogen-containing material have been

developed since that time, each in the attempt to improve visualization and decrease the toxicity.

Dandy of Baltimore (2), in 1918, first began to use gas to outline the ventricles and subarachnoid spaces of the brain. Since then, this has become a universal procedure and is a "must" in most cases of brain tumor localization.

Robb and Steinberg (5) were the first to have the temerity to put large quantities of diagnostic opaque material into the blood stream for visualization of the heart and great blood vessels. Their announcement sent many men to work, and a host of names are associated with vascular visualization. Along with angiocardiography, aortography became popular, then cerebral angiography (both venous and arterial) and sinography as well.

With the development of rapid serialographic work, it has been thrilling to see how easy certain intravenous opaque materials could be followed through from the right side of the heart into the abdominal aorta, leading to hepatolienography; and, still later, renal outlines were shown with pyelograms and, finally, cholecystograms were possible.

Visualization of the blood stream has been a great aid to the brain surgeon in the diagnosis of not only blood vessel anomalies and abnormalities, but as indirect evidence of tumors. Within the last few years this has been developed to an extraordinary degree of safety and diagnostic help. The visualization of the venous sinuses (sinograms) and the venous circulation has aided in the diagnosis of intracranial masses and vascular abnormalities and anomalies.

Visualization of vessels elsewhere, in the extremities and in the intra-abdominal circulation, has guided the surgeon in many an otherwise obscure case. Splenoportography has been accomplished by direct injection of the opaque material into the substance of the spleen. All of these procedures have the same purpose, that of visualizing an otherwise nonopaque structure and bringing about contrasting densities. The reader is referred to the bibliography of any standard text or monograph for the names of various individuals responsible for the development of these various procedures.

It is of interest, however, to observe that two of the most important contributions to diagnosis, with or without opaque material, were traditionally American in their origin—that of the Graham-Cole group in Saint Louis on the biliary tract, and the fundamental work of Dandy on the ventriculogram and encephalographic studies. Much of the urographic work was also developed in America. Our American radiologists and their surgical confreres have, moreover, been quick to adopt and develop any procedure that was proffered by foreign workers and which showed promise.

Iodized oil was first used by the French investigators to outline the bronchial tree. The same material has been used in other body cavities and potential spaces, such as abscess cavities and the genitourinary tract.

Special opaque material has been developed for the spinal canal to reveal defects in its outline and/or any obstruction to the normal flow of the cerebrospinal fluid. Gas has also been used in the spinal canal, and iodized oil has been injected directly into the intervertebral disc to show its abnormalities.

The chances are that the possibilities of developing better contrasting media for various portions of the anatomy are very good. The problem is one of finding a selective uptake or excretion of a given nontoxic material in order to outline the body tissues and cavities.

RELATIONSHIP OF DIAGNOSTIC RADIOLOGY TO SURGERY

One might debate the question as to which specialty has been most benefited by radiology. However, be that as it may, there are so many avenues in which the radiologist has been both of diagnostic and therapeutic aid that most of the basic clinical research has been a combined problem shared very often by the surgeon who was the catalyst in initiating the study.

Perhaps no other branch of surgery has been helped more by radiographic procedures than has the proper treatment of fractures. Before good roentgenograms were obtainable, the surgeon could only guess what the actual condition was. Now guesswork is unnecessary, and at the present time, particularly when so much internal metallic fixation is used in the treatment of fractures, it is of utmost importance to get the details of every case early and accurately.

Early in the history of radiology, it had become apparent that various types of visualization due to the calcium content produced by a certain pathological process could be appreciated roentgenographically, and various types of calculi in the various systems of the body were rec-

ognized, and their size, shape, and position determined. Certain tumors were found to calcify and vascular calcifications were apparent. The contrast provided by gas in the bowel, by gas inserted into, or which had leaked into, any body cavity, or by gas which had formed in a body cavity by natural processes was quickly recognized.

The pioneer work of those interested in intestinal obstruction with its surgical implications led to some of the most important advances in diagnosis. Wangensteen, Miller and Abbott, and a host of other surgeons and radiologists are associated with this work.

The manifestation of foreign bodies in the chest, both indirect and direct, was greatly aided by radiology. The names of Jackson, Manges, and Clerf are particularly outstanding in this regard.

The pioneer work of Graham, Cole, Copher and Moore in developing opaque material for use in the gallbladder and, later, for oral administration, has previously been mentioned. It can be generally agreed, we believe, that no single bit of clinical research was of greater importance from the diagnostic standpoint than was the development of cholecystography. Closely allied to cholecystography, and of equal importance in some postoperative states, is the cholangiographic detail that has been worked out in recent years.

As far as the urinary tract is concerned, the first great aid in visualization of the renal pelves, ureters, bladder, and urethra was obtained from retrograde injection. Later the discovery of an intravenous opaque material led to further advancement in the pathologic diagnosis of the urinary tract.

Intracranial diagnosis for cranial surgery was practically revolutionized when Dandy first used a gas to visualize the ventricular system and subarachnoid pathways of the brain. We think it fair to say that before the advent of ventriculography and encephalography there was perhaps only a 10 per cent chance of localizing a brain tumor from the indirect changes in the osseous landmarks in the skull or the true calcification of the tumor mass. However, with the advent of the air studies, the possibility of localizing a brain neoplasm was greatly enhanced to about 85 to 90 per cent when such studies were possible. Add to this the recent angiographic studies both from the arterial and venous aspects and one can appreciate the tremendous help that the roentgenographic procedures have given to the surgeon.

Studies of the heart and great vessels by means of cardiac catheterization and angiocardiography have further aided in the diagnosis of congenital and other heart disease, which in turn has guided the surgeon in his procedures. Not only were the heart and thoracic great vessels studied by means of serial films, but some of the more improved apparatus has made it possible to visualize the abdominal aorta and its branches as well as the liver, spleen, and kidneys.

A material called "thorotrast" was at one time popularized for visualization of the reticuloendothelial system, but it has subsequently been discarded, for the most part, because of its radioactive nature with the hazard of subsequent harm to the tissues examined.

Lung mapping with iodized oil has been of great advantage in the diagnosis of bronchiectasis, bronchostenosis, and related conditions. It is, perhaps, of equal importance to the endoscopic procedures in the majority of cases.

Methods of diagnosis in the gastrointestinal tract have improved with the years. After the early experimental work of Cannon, it remained for later investigators to develop more meticulous techniques by the use of compression devices producing relief patterns, such as small bowel motility patterns, to really put the study of the gastrointestinal tract on a sound basis. Moreover, the improved techniques enabled the workers to be more cognizant of the limitations of the examination, regardless of the level in the alimentary tract.

At the present time a major surgical procedure rarely ever is done unless some kind of radiologic diagnostic procedure has been carried out previously.

Myelographic studies of the spine with both opaque and gas contrast media have done a good deal to enhance the diagnosis of cord and disc lesions of all types.

Angiographic work in the extremities has been a big help to those who would better understand the mechanical processes behind various obstructive phenomena, varicosities, and arteriovenous aneurysms.

Gynecology has benefited by the procedure of injecting opaque material into the uterine cavity and fallopian tubes. This has been an adjunct to the Rubin test for some time and has helped solve many sterility and other problems. The use

of irradiation both from gamma sources and high voltage roentgen rays has done a great deal to effect the cure and palliation of pelvic tumors. Indeed, in certain types and stages of tumors the radiologic treatment is considered by many as the method of choice.

Pelvimetry has been done roentgenographically for many years. Indeed, it was first attempted in 1901 and since that time many methods of getting internal measurements when the external were not too reliable have been devised. We know now that the more modern studies have shown that the fetal-pelvic relationships are as important as the actual measurements, and that much other information can be obtained concerning the pregnant uterus and the fetus by roentgenographic means.

It has been interesting to watch the evolution of the attitudes and approach of both radiologists and of other specialists in regard to the responsibilities of this field. The radiologist has been rather jealous of his position because of his greater knowledge of the hazards involved in handling the sources of ionizing radiations and his awareness of the importance of accurate handling of dosage and general management of the patient. Because of the close relationship of radiology to medicine and surgery, it has been very difficult to keep from decentralizing radiological work, particularly in regard to diagnosis. It is of interest, however, that the more the associated specialist has found it necessary to lean on radiology as an adjunct to his work and the more adept he becomes at his work, the more he seems to feel dependent upon the radiologist's co-operation in preventing errors associated with "over-reading" or "over-interpretation." It seems there will always be a need for a direct roentgenologic approach before the clinical radiologist and the clinician make a final interpretation of x-ray findings. A knowledge of the limitations of the art is very important, and no one appreciates this more than the radiologist himself, acting independently, yet nothing is more important than the clinician's co-operation. We are, for example, as pointed out before, indebted to other specialties, and to surgery in particular, in developing some of our diagnostic contrast media.

Currently, one of the rather troublesome problems involves the economics of radiology. Hospital managements have served to hamper a good deal of the development of the various radiologic departments in the institutions. They have been accused of selfishly attempting to practice medicine through the x-ray department, seeking to profit as a corporation by "selling x-rays" and at the same time hiring the radiologist to interpret the films. Not only is this considered unethical, but it is in some cases deemed illegal and can become a very reprehensible situation. Whenever this situation can be avoided, it has always made for better standards and more progress in every radiologic department, for then the patient, rather than the institution, is the one which profits. The future of all so-called hospital ancillary services is threatened because of the hospital administration's desire to profit by selling these services, and this is the only cloud at the present time over an otherwise very bright looking future for radiology as a specialty.

RADIOTHERAPY

Since the discovery of radioactivity by Becquerel in 1896, atomic energy had been in use ever since the birth of radiology, but the explosion of the atomic bomb both experimentally and for military purposes over Nagasaki and Hiroshima ushered in a new radiologic era. What this so-called "modern atomic era" did for radiology was suddenly to make available for general use the artificial radioactive materials. It would be perhaps much better to call it the advent of the "isotope era," or, more particularly, the "era of the use of artificial radioactive materials." Even the most evil things bring their blessings, for out of the chaos of war came the necessity of building the large sources of these materials which a benevolent government turned over to the profession for civilian use. Not only did we obtain the materials for therapeutic application, but through the hazards and casualties of the war an opportunity was obtained to see the effects of high energy ionizing radiations. Thereafter began the serious study of late sequelae and immediate measures were adopted for protection. Indeed, it might be said that the public has become actually overconscious of the dangers, so that there has been a feeling of undue apprehension. This is almost unavoidable in such a situation. Although the radiologist had long considered the dangers of ionizing radiations from their genetic effects, yet the beginning of the modern atomic era served to emphasize to both the profession and lay public this possible harm. It might be said parenthetically at this point that one should be rather conservative in one's estimate of the far-

reaching genetic effects, for it is difficult to translate the findings in the laboratory animal into those in the human being, and, moreover, the injured gene may not be manifest for many generations of inbreeding. In the meantime, it behooves us to bear in mind at all times the harmful effects of both diagnostic and therapeutic procedures when ionizing radiations are used and never to apply the modality unless entirely necessary.

With the study of the biologic effects that have been observed through the years, it becomes evident that the application of all ionizing radiations therapeutically requires careful thought and special training. Much harm has come from its promiscuous use. There is no "rule of thumb" procedure for every given case. Unfortunately, in all therapeutic applications both the host and the disease process must be considered. In the case of tumors, for example, we are now aware of the fact that every one has its lethal dose, but when this lethal dose approaches that of the tumor bed, we then approach the zone of nonradiocurability. Moreover, radiosensitivity and radiocurability are by no means synonymous. Our physical and clinical research workers have found that even with high intensity radiations, which are more penetrating and less harmful to the more superficial layers of tissue penetrated, it is quite obvious that there has as yet been no proved specificity of wave length. Because of this, radiotherapy, in any type of cancer, has not yet been proved to be the sine qua non in treatment. Any tumor that is accessible can be cured, but this accessibility must be defined in terms of (1) relationship of the tumor lethal dose to that of the tumor bed, (2) the depth of the tumor in the tissues, and (3) the life history of the tumor. Thus, while a superficial skin malignancy and most intracavitary lesions can be treated quite successfully, yet there is still difficulty with deep-seated tumors. Wise is the man who can properly combine the effects of the principles of surgery and radiotherapy for the best results.

While radiotherapy as an adjunct to surgical procedures has not been as satisfactory as perhaps originally hoped for, we have learned a good deal through the years about the life history, pathologic stage, radiosensitivity, and curability of certain tumors. Radiotherapy has been both curative and palliative. In general, it can be said that when a tumor is accessible, it is radiocurable, but the radiocurability is dependent upon its radiosensitivity. So often this is forgotten by many.

Perhaps the same rules apply surgically. In the case of the surgeon the inaccessibility of the tumor is bound up with the inability to see to what extent it has grown and spread and/or with its presence in a vital structure, which would make its removal incompatible with life. Radiotherapeutically, its inaccessibility depends upon whether the radiosensitivity of the tumor approaches that of the tumor bed. If this occurs it would make it impossible to give lethal doses without ruining the normal tissue as well.

The combined surgical and radiological treatment of pelvic tumors has done much to increase the life expectancy of patients with such tumors. Indeed, it has brought many a cure to an otherwise hopeless case. The combination of gamma radiation and surgery in lesions of the mouth, tongue, pharynx, and larynx has resulted in great strides in this direction. The palliative effect of certain isotope treatments of abdominal tumors and metastatic tumors to the lung and pleura is a more recent development.

In 1942 Fermi of the University of Chicago was the first man to build a nuclear reactor (atomic pile) for the purposes of producing isotopes. Before that time the Curie-Joliots had produced radioactivity, and the cyclotron had been built out at Berkley, California for the acceleration of high speed particles. The resonance transformer had been brought into use as well as the Van de Graaff machine and linear accelerator.

After the advent of the so-called modern Atomic Era, the surgeon was aided greatly in his work on the thyroid gland by functional and tracer studies. Brain tumor localization was also aided. The greatest advances, however, concerned diseases that fall in the category of medical conditions, for the most part, namely, polycythemia and the leukemias which require the use of P^{32}.

There has also been an opportunity to study the circulation with isotopes. Blood volume studies are possible and at the same time a study of the cardiac output. There is also an opportunity to study the blood electrolytes.

Isotopes have been used for tracer work as well as therapeutically. In general, the principles of the tracer studies concern (1) the localization of the isotope in certain areas producing characteristic patterns on the autoradiograph and in Geiger counter studies, (2) the dilution of

certain tagged material throughout the body, and (3) the alteration of certain biologic systems which becomes apparent through biochemical studies with the isotopes.

The biochemical research now going on in various university centers all points to the eventual solution of many a heretofore unsolved problem. With the advent of the use of isotopes, the problem of good laboratory facilities and protective measures has created the necessity for strict supervision of this sort of work to prevent hazard not only to the patient but to the operator and general public.

THE PRESENT RELATIONSHIP OF SURGERY TO RADIOTHERAPY

It is now almost the universal opinion that the diagnostic and therapeutic aspects of radiology should be separate and distinct units. Particularly is this true in large institutions where it is almost physically impossible for the two to be combined; even for philosophic reasons alone it seems mandatory that the two be separated. Each of the two fields of radiology has become so specialized and involved that it is usually better to have the two divided, and this is true particularly for the therapeutic division. It is now a necessity that the radiologist have skill in curie therapy and roentgen therapy, as well as a familiarity with the use of the various newer modalities including the higher energy ionization radiations which are produced by the supervoltage apparatus, the isotopes, and the various particle radiations.

The ideal radiologist usually has some surgical training in his background and needs basic information in surgical pathology as well, in order to appreciate better the life history and histopathology of the tumors he treats. In his attack on malignant tumors, the surgeon is limited mechanically, whereas the radiotherapist is limited only biologically. When the growth is localized, the surgeon can remove it regardless of the biologic nature of the tumor. He is limited only by its location and size. In contrast to this, when the radiologist attacks the tumor, its response depends upon the type of tumor cells, their differentiation, the volume of the tissue radiated, and the surrounding tumor bed. If the tumor sensitivity approaches that of normal cells, then it is difficult to get the proper lethal dosage into it without destroying the normal surrounding tissues.

The radiologist must also be aware of the physical problems involved in order that he may properly evaluate and compute tissue or tumor dosage and be able to speak a common language with his confreres in his own field and in surgery. He must keep up his clinical interest at all times for this has a great bearing on the management of each case.

Early in the history of radiology the surgeon was usually the first to apply curie therapy because of the necessity for some knowledge of surgical technique in its application. This has gradually been relinquished by the surgeon because the radiologist in many cases now gets a basic training that enables him to do as well himself, or at least work in close co-operation with the surgeon.

When roentgen therapy became popular and developed as an adjunct or a substitute for surgery, there was a tendency for the surgeon to relinquish the duties to the radiologist alone and, more and more, it has become apparent that except in selected cases, particularly lesions around the mouth and pharynx, there is little that the roentgen ray cannot accomplish.

It now becomes more and more obvious that there is a need for special training for anyone who would attempt to apply ionizing radiations in any form. The surgeon's desire to insert radium, for example, has in the majority of cases led to poor standards in dosage and end results, unless he has been in very close co-operation with the radiotherapist. It is much better that the problem at the present time be left entirely in the hands of the radiologist with surgical training. When he handles the entire case, managing it from beginning to end, usually better end results are obtained.

In a recent book on radiotherapy, Carling, Windeyer, and Smithers (1) state the following in their introduction, which about sums up the point that we wish to make: "Specialization, though a necessity, has many disadvantages. When a specialty requires a great deal of expensive apparatus and much technical assistance . . . it becomes increasingly difficult to avoid the dangers inherent in fixing its boundaries and making its practice exclusive. When to these difficulties are added the problems inherent in the handling of potentially dangerous radioactive materials and high voltage apparatus which must be controlled by strict codes of practice, unusual care is necessary to insure a healthy development.

Radiotherapy, even more than most specialties, requires the freest possible interchange of ideas and the closest practical collaboration with others working in associated fields. The progress of radiotherapy may well depend as much on the success with which it preserves some elasticity of organization and deliberately avoids its tendency to isolation as upon the construction of more powerful apparatus or the introduction of new treatment methods."

It might be well to end this rather brief historical discussion with this statement. However, we finally would like to emphasize, as a representative of the radiologic specialty, and indeed as an unofficial representative of the radiological profession as a whole, that all radiologists are aware of the importance of close co-operation and integration with all of the specialties, and this liaison should perhaps be stronger with surgery than with any other specialty. Radiology has a great future and it must live as an intact specialty if for no other reason than to keep the standards high in these various co-operative endeavors. It is so easy to decentralize the diagnostic phases, but each radiologist believes that the one thing that has kept standards high is the purely radiologic approach in the midst of integrated and co-operative endeavors. In the opinion of the writer, the story is only beginning as far as radiologic development is concerned, both technically and professionally, and it is thrilling to look toward a rich future.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Temporary External Fixation of Fractures of the Mandible (Inchiodamento percutaneo provvisorio nelle fratture di mandibola). A. BANCALE. *Arch. ital. chir.*, 1954, 78: 509.

AFTER REVIEWING the various techniques of intraoral and extraoral fixation of mandibular fractures, the author advocates the use of Kirschner wires for the external fixation of mandibular fractures. After reduction of the fracture under either general or local anesthesia, the Kirschner wire is introduced through the skin and drilled into the bone in such a way as to go across the fracture line and fix the fragments in good alignment. The nail is left in for 15 to 20 days, during which period the patient takes a liquid diet. This method of temporary fixation of mandibular fractures has the advantage of simplicity and good alignment.

Intraoral wiring is used for simple linear fractures, but the method described is better in comminuted fractures, where with two pins one can hold multiple fragments in alignment. The patient with this method of external fixation undergoes the minimal risk of infection, and he also can open the mouth and eat soft foods. Six patients treated by this method are presented and the results are very encouraging.

—Alexander J. Conte, M.D.

Slow Growing Tumors of the Jaw (Les tumeurs "lentes" des maxillaires). PAUL DESAIVE. *Acta chir. belg.*, 1955, 54: 27.

SEVENTY-EIGHT CASES of tumors or pseudotumors of the maxilla and mandible observed at the anticancer center and at the tumor clinic of L. Merlot in Liege are reviewed. There were 3 metastatic and 75 primary tumors. The primary tumors were classified as follows: Hamartomas (3 cases, including 1 odontoma and 2 dentigerous cysts), pseudotumors dystrophies (42 cases, including 3 fibrous dysplasias, 3 Paget's disease, 12 fibrous epulis, 22 alveolar odontoclastomas, and 2 osteoclastomas), connective tissue tumors (20 cases, including 6 benign osteofibromas, 11 sarcomas, and 3 myelomas or endotheliomas), and epitheliomas (10 cases, including 2 transitional cell epitheliomas, 1 mixed tumor of salivary gland type, and 7 cases of adamantinoma). This group of lesions is characterized by slow growth and a prolonged course.

Hamartomas characteristically have a long latent period before they become symptomatic. They must be completely excised, and, if this is done, recurrence does not occur.

Fibrous dysplasia of the jaw may be congenital or may be related to parathyroid disease or the neurofibromatosis of von Recklinghausen. It is a painful condition affecting mostly females. Treatment in cases in which the underlying endocrine disturbance can be corrected is satisfactory.

Paget's disease involves the maxilla more often than the mandible. The author recommends x-radiation therapy.

Among 12 cases of fibrous epulis, 7 involved the mandible and 5 the maxilla. The patients were 2 men and 10 women. Treatment consisted of electroresection followed by irradiation. Incomplete excision is usually followed by recurrence. Radionecrosis of bone may occur in some cases as a complication of treatment.

Osteoclastoma is a rare type of giant cell tumor. The author saw 2 cases in 29 years of practice, both in the mandible. Treatment is partial resection of the mandible followed by radiation.

There were 6 examples of benign connective tissue tumors. The author believes these tumors originate from the enamel organ of deciduous teeth. Treatment is surgical excision followed by electrocoagulation of the tumor base.

Sarcomas of the mandible, fortunately, are rare. Among 11 cases observed by the author there were 6 men and 5 women, varying from 18 to 77 years of age. Six cases involved the mandible and 5 the maxilla.

There were 3 spindle celled sarcomas, 1 fibrosarcoma, 1 fibromyxosarcoma, 3 osteogenic sarcomas, 1 osteochondrosarcoma, and 2 chondrosarcomas. In their early stages these tumors are often mistaken for inflammatory processes. Biopsy of suspicious lesions is essential. Treatment is wide resection of the mandible or maxilla.

The tumors of epithelial origin, of which there were 10 examples, were all malignant. Adamantinoma was the most common variety. The author recommends radical resection followed by radiation.

In general, tumors of the maxilla and mandible are not adequately treated when treatment is first undertaken. The author urges more radical surgery.

—Frederick W. Preston, M.D.

Discussion on the Treatment of Malignant Disease of the Upper Jaw. A. J. GARDHAM, C. P. WILSON, and ALAN H. HUNT. *Proc. R. Soc. M.*, Lond., 1955, 48: 71.

THE DISCUSSION by Gardham of his own experience is presented to show that the end results of treatment of carcinoma of the upper jaw disclose at least two failures for every success. Thus, he cites the good reason for looking at treatment from the standpoint of the uncured, as well as the cured, patient.

When the carcinoma of the upper jaw originates in the nasal sinuses, the chances of a permanent cure are extremely low, and the penalties of any attempt at radical cure are very considerable if the attempt involves a major excision. The risk of recurrent or residual growth in large excavating wounds is considerable, and when this happens, the patient is in much more desperate condition than he was preoperatively.

The worst features of an untreated and uncured growth are pain and foul discharges. Very often the pain is due to sepsis and if this is controlled by diminishing the extent of the growth and providing free drainage, the pain may be diminished considerably. The same holds for the discharge. This author stresses the point that an adequate cancer operation is not technically possible when dealing with growths in this region of the body, and, furthermore, from autopsy statistics that he has gathered it is highly probable that most of these patients have distant metastases when they first seek help for their primary lesion.

The remarks of Wilson are restricted to growths arising primarily in the antral and anterior ethmoidal regions. He states that most workers agree that the best results are obtained by a combination of surgery and radiotherapy. Surgical extirpation is limited to small growths commencing on the alveolus or in a toothed socket. These cases are not numerous and usually can be dealt with by an operation short of radical excision of the upper jaw. This author believes that radical upper jaw resection has no place in the modern treatment of carcinoma in this area.

Removal of a piece of tissue is necessary to make a diagnosis before treatment is begun. If there is marked infection of the antrum, drainage should be undertaken at the same time as the biopsy, and this drainage preferably should be intranasal. A full course of external radiation is then given; both teleradium and deep x-rays have been used at the Middlesex Hospital. This reporter believes that the risk of necrosis of bone is less when teleradium is used rather than deep x-rays.

After the inflammatory phase has subsided, which should be from 4 to 6 weeks, the important part of the control takes place. Its object is to provide a permanent window for future inspection, to destroy any remaining neoplasms, and to provide a large single cavity for any future treatment. The details of the technical procedures that are followed to expose the nasal and antral cavities through the mouth are presented. The most annoying complication of this operation is the common sequestration of bone about the zygomatic region and in the area of the tuberosity of the palate. A serious complication has been the development of cataracts in the eye on the affected side, which ordinarily occurs within 2 years of the time of the operation.

This author believes that block dissection of the neck should not precede the treatment of the primary growth, but should be undertaken only after there is reasonable evidence of total obliteration of the tumor, whether it be by radiation or by surgery.

Hunt stresses the point that ear, nose, and throat surgeons are not radical enough in their surgical approach to these cancers, as he believes that surgical extirpation is far more apt to be successful than radiation alone. The combination of x-ray and surgery is most practical and feasible, however, and has been carried out extensively at St. Bartholomew's and the Royal Marsden Hospitals. He stresses the urgent need for total ablation of the malignancy without regard to the resulting deformity as many times plastic procedures can eventually overcome much of the unsightliness and internal prostheses will be found very effective in preventing horrifying disfiguring sequelae.

—*Matthew H. Evoy, M.D.*

EYE

A Note on the Management of Recent Fractures of the Zygoma Involving the Floor of the Orbit. WILLIAM RUBIN. *Am. J. Ophth.*, 1955, 39: 183.

A METHOD OF DEALING with fractures of the zygoma and orbital floor is presented and 4 cases are discussed.

It is pointed out that in any injury to the zygomatic area there is the possibility of fracture with displacement of parts of the orbital rim. Only careful palpation and roentgenographic examination will prevent misdiagnosis while the tissues are still edematous.

Once the presence of fracture with displacement is determined, the author proceeds with reduction and fixation as follows:

The antrum on the affected side is entered by the usual Caldwell-Luc procedure. All the tissues overlying the anterior surface of the maxilla and zygoma, including the periosteum, are elevated to the orbital rim in order to expose all fracture lines, displaced fragments, and alterations in contour. A 2 cm. window is then made into the antrum through the maxilla. A small drill hole is also made through the most lateral portion of the anterior antral wall (usually just lateral to the zygomaticomaxillary suture line). About 8 inches of stainless steel wire are threaded through the drill hole and the end is brought out of the antral window prepared previously.

Since the malar bone is generally displaced downward and backward, reduction is accomplished by elevation forward and upward. To obtain this, an artery clamp is inserted under the arch of the zygoma and pressure is made in the desired direction by using the upper jaw as the fulcrum of a lever.

The two free ends of the wire are looped around two or three incisor teeth of the upper jaw and twisted together to exert firm tension on the displaced bone and to hold it in correct position. Additional support is provided by packing the antrum.

Three cases of fresh fracture in this area are described and the treatment outlined was entirely satisfactory.

A fourth case with firm union of the displaced fragments, which caused depression of the floor of the orbit, was successfully corrected by a subperiosteal bone wedge inserted in the floor of the orbit.

—*Henry M. Dismukes, M.D.*

Unilateral Paralysis of the Elevators of Supranuclear Origin. ENRIQUE MALBRAN and ATILIO LUIS NORRIS. *Brit. J. Ophth.*, 1955, 39: 73.

THE AUTHORS discuss the probable etiology, classification, and treatment of unilateral paralysis of the elevators of the eye (inferior oblique and superior rectus muscles). Ten cases, illustrating the various types of this condition, are presented and the results of treatment are tabulated.

The authors have accepted Bielschowsky's idea that this syndrome is due to a supranuclear lesion. It is difficult to accept the existence of a nuclear lesion which affects only the superior rectus and inferior oblique muscles, leaving the other muscles innervated by the third nerve intact. An infranuclear or orbital lesion is even more improbable. In favor of a supranuclear lesion is the fact that it is usually possible to demonstrate the integrity of the peripheral neurone by the presence of one or more of the following in the affected eye: (1) Bell's phenomenon, (2) The postural reflex (Schuster's "doll's head phenomenon"), and (3) the rotary power of the elevators when the head is tilted. The clinical picture is described as follows:

It is possible to ascertain that the movements of elevation of one eye are totally absent and, occasionally, both muscles appear completely inactive; in other cases the functional deficiency of the inferior oblique muscle is more marked than that of the superior rectus, or vice versa. Generally, the patient offers the whole clinical picture of vertical strabismus with descent of the affected eye and pseudoptosis or true ptosis. More rarely the paralyzed eye maintains fixation and the normal eye displays a strong vertical strabismus with elevation in secondary deviation.

The types of the condition are classified (White), and this classification is important in deciding on the surgical procedure:

Type 1. Binocular vision is maintained by tilting the head backwards; in this type there is generally good vision in both eyes.

Type 2. On fixation of the healthy eye, the paralyzed eye is in hypotropia accompanied by pseudoptosis or true ptosis with reduced vision on this side.

Type 3. On fixation of the paralyzed eye which has good vision, the healthy eye with secondary deviation becomes markedly raised and vision is diminished.

Ten cases are presented, of which 3 were type 1, 6 were type 2, and 1 was type 3. In only 2 cases was it impossible to demonstrate the integrity of the peripheral neurone by the presence of one of the three reflex actions of the elevators noted previously. Two cases showed no ptosis, 6 cases showed pseudoptosis, and 1 case showed true ptosis; in 1 case no definite statement was made as to the type of ptosis.

The surgical approach in these cases is determined by the type of condition. In type 1 surgical intervention is necessary only if the backward head tilt is marked. White favored a strengthening procedure on the two paralyzed muscles, but the authors achieved a good result in their single case of this type by weakening the elevators of the unaffected eye.

Type 2 cases are usually attacked by strengthening the paralyzed muscles. When contracture of the ipsilateral antagonists exists, weakening procedures on these muscles (inferior rectus and superior oblique) are favored by the authors, and if this is not sufficient, weakening procedures are used on the contralateral superior rectus and inferior oblique muscles.

In type 3, a weakening operation on the superior rectus and inferior oblique muscles of the nonparalyzed eye is recommended. If the deviation is large, weakening of the inferior rectus and superior oblique muscles of the affected eye may be necessary.

Of the 10 patients treated surgically, 4 had no remaining vertical deviation in the primary position, and 2 had deviations of only 4 or 5 degrees; the treatment or follow-up was incomplete in 4 cases.

Unfortunately, the authors did not comment on the postoperative status of the ptosis shown in 7 cases originally. —*Henry M. Dismukes, M.D.*

Surgical Classification of Squints with a Vertical Deviation. ALFREDO VILLASECA. *Brit. J. Ophth.*, 1955, 39: 129.

VERTICAL SQUINTS are divisible into primary and secondary types. The primary type may be an isolated vertical squint or it may be accompanied by an added horizontal deviation. As one's gaze is generally below the horizontal, the fixing eye is usually the hypotropic one, so that with paresis of the superior rectus muscle the involved eye usually fixes, while in paresis of the superior oblique muscle fixation is taken up by the unaffected eye. Paresis of both elevators in one eye, the superior rectus and the inferior oblique, is accompanied by pseudoptosis which disappears with the cover test. Paresis of homologous muscles of both eyes (both superior obliques) causes no apparent vertical deviation in the primary position.

Cases of dissociated vertical divergence usually have binocular fixation so that the alternating hyperphoria is only manifest after occlusion. When an eye is permanently converged it may develop a secondary hypertropia since the adduction position, which gives the inferior oblique muscle a mechanical advantage over the superior oblique, favors a spasm of the former. If in supraversion and infraversion the degree of horizontal strabismus shows only slight variation the case is one of a primary vertical defect plus a horizontal deviation. Such a case requires correction of the horizontal and vertical deviations at the same operation. In secondary vertical deviation, however, the horizontal squint should be corrected first. The secondary vertical deviation then often disappears although it may take from one to two years.

—*James E. Lebensohn, M.D.*

Treatment of Trachoma with Erythromycin; a Preliminary Report of 21 Cases. RICHARD R. BUTTON. *Am. J. Ophth.*, 1955, 39: 223.

THE AUTHOR presents a review of the etiology and cytology of trachoma. Twenty-one patients were treated with systemic erythromycin and the results are analyzed.

The research that led to our present state of knowledge of trachoma is briefly outlined and special attention is given to the contributions of Halperstaedter and Von Prowazek, Bengstom, Busacca, Cuneoid and Nataf, and Thygeson.

In this study, each of 21 Navajo Indian children were examined and their trachoma was classified ac-

cording to the Mac Callan classification. Those showing only conjunctival injection were considered as having stage 1. Those with follicular or papillary hypertrophy of the upper tarsal conjunctiva were classified as having stage 2a and 2b, respectively. Stage 3 trachoma included cases with pannus confined to the upper limbus or cornea, together with subepithelial infiltrates, punctate staining, or ulceration. More advanced cases were not included in the series.

In both the diagnosis and evaluation of treatment, primary emphasis was given to the study of the conjunctival cytology. The typical case showed large, poorly staining epithelial cells containing inclusion bodies, large poorly staining follicle cells or lymphoblasts, and an intensive lymphocytic infiltrate. Plasma cells and Leber cells were also part of the microscopic picture. Each child had an initial cytologic examination and the examination was repeated at two-day intervals for the duration of therapy.

Each child was treated orally with 2 to 3 mgm. of erythromycin per pound of body weight, given at 4 to 6 hour intervals. No local medication was given.

This treatment resulted in marked clinical improvement and a fairly rapid return of the cytology to normal. The inclusion bodies usually were first to disappear, followed by the follicle cells, macrophages, lymphocytes and plasma cells, in approximately this order. The clinical signs were found to persist for some time after the cytology was normal. It was found that at least 12 days of treatment were required, since recurrence was observed in some cases in which treatment was discontinued earlier. Ten of the cases which responded favorably to erythromycin had previously failed to respond to local and systemic sulfonamides.

Stages 1, 2, and 3 required an average of 4, 4.9, and 5.7 days of treatment, respectively, before the cytology returned to normal.

The author concluded that erythromycin appeared to be effective in the treatment of trachoma in stages 1, 2, and 3. —*Henry M. Dismukes, M.D.*

The Status of Lenticular Opacities Caused by Atomic Radiation: Hiroshima and Nagasaki, Japan, 1951-1953. ROBERT M. SINSKEY. *Am. J. Ophth.*, 1955, 39: 285.

THIS ARTICLE concerns ocular findings made on survivors from the atomic bombs dropped on Hiroshima and Nagasaki. The report concerned an investigation of 3,700 exposed and unexposed individuals from May, 1951 to December, 1953.

Evaluation was made concerning the differential diagnostic problem of radiation effects on the lens. The correlation between the lenticular changes caused by nuclear radiation and other factors, such as age, sex, epilation, distance, and shielding, was studied. Careful studies were made to determine the progression of lesions caused by nuclear radiation. An attempt was made to determine the present visual loss caused by nuclear radiation from the aforementioned two atomic bomb explosions.

On direct illumination with a slip lamp, granular plaques were observed on the posterior capsule axially. The plaques were ameboid in appearance, both horizontally and vertically, with one or more pseudopods. Some of the more extensive lesions were lacelike or had a ground glass appearance. In the most advanced cases, streamers were present which appeared to extend into the posterior cortex.

This study indicated that some previously observed posterior subcapsular opacities were the result of nuclear radiation rather than a normal finding associated with age. It was also evident that radiation cataracts might be readily confused with lenticular opacities of other etiologies, and the importance of pre-employment lens studies is indicated in workers who might be exposed to radiation. It was believed that the opacities observed over the 4 year period increased very little or not at all and that there had been negligible loss of vision. —*Andreas V. Mortensen, M.D.*

The Vascular Supply of the Optic Pathway; Further Studies by Microarteriography of the Optic Nerve. J. FRANÇOIS, A. NEETENS, and J. M. COLLETTE. *Brit. J. Ophth.*, 1955, 39: 220.

IN THESE STUDIES the orbit was removed at postmortem complete with the optic nerve and its entire vascular supply, after which the arteries were injected with the Heyden thorotrast solution and fixed rapidly with a special formalin mixture.

Microangiograms showed penetration through the smallest vessels and demonstrated two basic vascular patterns: (a) transverse, having the form of a pentagon, encircling single nerve bundles at regular distances; and (b) longitudinal, in the interfascicular spaces between the bundles. All these vessels anastomose in a very intimate manner. In the optic nerve sheath the capillary network is composed of fine cobweblike formations and large irregular meshes. Venous blood returns chiefly through the central retinal vein. —*James E. Lebensohn, M.D.*

Harada's Disease Treated with Cortisone; Report of a Typical Case. FREDERICK C. CORDES. *Am. J. Ophth.*, 1955, 39: 499.

THIS CONDITION, which affects the more pigmented races and occurs more frequently in the Japanese than in others, is characterized by bilateral detachment of the retina which develops in the course of a low-grade uveitis. Of the 10 American patients, 4 were negroes, one was a Japanese, 4 were of Italian extraction, and one was reported as "white."

General malaise and meningeal irritation usually precede the bilateral, diffuse, exudative choroiditis, or uveitis; edema of the retina and optic nerve, perivasculitis and vitreous opacities supervene, and are followed by bilateral separation of the retina. The onset is acute, the course is sluggish, and spontaneous recovery occurs in from 6 to 12 months.

Small separations disappear spontaneously. Extensive ones enlarge until coincident with the subsidence of the chorioretinitis. Resorption of the subretinal exudate begins, resulting in flattening of the separated retina and lessening of the area of separation.

The most common ocular complication of Harada's disease is glaucoma.

The relationship of Harada's disease to the Vogt-Koyanagi syndrome and to sympathetic ophthalmia are discussed. Current opinion favors the first two as clinical variants of the same condition. Sympathetic ophthalmia seems unrelated.

Cordes presents a case of Harada's disease in a Japanese woman, 31 years of age, who complained of bilateral loss of vision, accompanied by general malaise, meningeal symptoms, and tinnitus. Edema of the optic discs and retinas led to bilateral separation of the retina 26 days after the onset of the disease. The patient was hospitalized and treated with cortisone. Two months later the separation had receded except in the lower periphery. Seven months after the onset of the disease the field of vision and the visual acuity had returned to normal.

It is concluded that cortisone which had been administered in a gradually decreasing dosage over a period of 6 months had no effect on the course of the disease. —*Joshua Zuckerman, M.D.*

Uses and Abuses of Adrenal Steroids and Corticotropin. MICHAEL J. HOGAN, PHILLIPS THYGESON, and SAMUEL KIMURA. *Arch. Ophth.*, Chic., 1955, 53: 165.

THE PHYSIOLOGIC EFFECTS, contraindications, precautions to be observed during therapy and withdrawal, dosages and routes of administration for cortisone, hydrocortisone, and corticotropin are discussed. The results of the treatment of various inflammations of the eyelid, conjunctiva, cornea, sclera, iris, and choroid with topically administered cortisone and hydrocortisone in 989 cases and with systemic medication in 89 cases are tabulated.

According to the authors, if the therapeutic response is not satisfactory with one of the hormones, another should be tried. The subconjunctival injection of cortisone or hydrocortisone is frequently effective after failure of drop therapy. Inflammations of the eyelids, conjunctiva, and anterior segment of the eye should be treated by the topical application of cortisone or hydrocortisone. The oral administration of these hormones, or the parenteral administration of corticotropin should be used in acute inflammations of the posterior segment or for chronic anterior ocular inflammations which do not respond to topical therapy. —*J. Jack Stokes, M.D.*

Vogt-Koyanagi Syndrome; Precipitated by Lens Extraction; Report of a Case. EDGAR A. SWARTZ. *Am. J. Ophth.*, 1955, 39: 488.

A CASE OF Vogt-Koyanagi syndrome is reported by the author as having been precipitated by lens extraction. This syndrome which consists of bilateral uveitis associated with alopecia, dysacousia, poliosis, and vitiligo, has not previously been reported as related to trauma or to surgery.

The opinion is expressed that the uveitis was induced by a sensitivity to toxic lens substance or by a virus introduced during the extracapsular extraction of a hypermature cataract, or that it was due to both factors.

The opinion is also expressed that sympathetic ophthalmia and the Vogt-Koyanagi syndrome are the same entity and due to the same cause, though the etiologic agent need not be the same in all instances.

The positive pigment test and the bilateral uveitis following surgery is consistent with the diagnosis of sympathetic ophthalmia.

In the Vogt-Koyanagi syndrome, the etiologic agent enters the cranial contents and progresses thence to the eye; in sympathetic ophthalmia, the etiologic agent enters the eye and progresses to the cranial contents.

The patient also exhibited a marked allergic reaction of unknown etiology, namely, massive urticaria.

The alopecia, poliosis, and vitiligo may have had the same basis.

A clinical entity was described by Courtney in 1942 in which a definite endophthalmitis resulted from absorption of lens matter, and he stated that such an inflammation is more prone to occur spontaneously in the second eye of an individual who has had an operative or traumatic rupture of the lens capsule of one eye, with consequent absorption of lens cortex. It could not be stated definitely whether the inflammation in the second eye is the result of spontaneous rupture of the capsule or whether the autolyzed lens matter passes through the capsule as through a semipermeable membrane.

The uveitis which was associated with paresthesia, psychosis, reduction of hearing, alopecia, poliosis, vitiligo, and urticaria was followed by glaucoma and blindness of both eyes. —*Joshua Zuckerman, M.D.*

EAR

The Pathological Findings in Acute Diffuse External Otitis. L. H. SOPHIAN and B. H. SENTURIA. *Ann. Otol. Rhinol.*, 1955, 64: 300.

AS A PART of their extensive investigations into the basic factors underlying inflammatory diseases of the external ear, the authors describe, for the first time, the histopathologic findings in acute external otitis. Skin biopsies were obtained from 5 patients. Striking pathological changes were noted in the epidermis, dermis, and glands.

The epidermal lesions varied from mild to severe. Hyperkeratosis, edema, acanthosis, parakeratosis, and hyperplasia were commonly seen. Changes were similar to those seen in atopic and contact eczema. The inflammatory process in the dermis showed unusual characteristics. The capillary and arteriolar vessels showed dilatation, endothelial swelling, hyperplasia, and sometimes thrombosis and necrosis—changes associated with toxic or allergic inflammations rather than pyogenic infections. There was a high content of eosinophils in the exudate. The dermal changes would seem to indicate the possibility of an altered tissue reactivity as a factor in the etiology of the disease.

The apocrine glands appeared atrophic and the epithelium appeared to be nonfunctioning.

These atrophic changes appeared to be due to compression of the glands by the surrounding inflammatory process and, possibly, interference with the vascular supply played a part. The sebaceous glands were minimally involved. —*John R. Lindsay, M.D.*

Fenestration—Past, Present, and Future. GEORGE E. SHAMBAUGH, JR. *Ann. Otol. Rhinol.*, 1955, 64: 149.

THIRTY YEARS after Sourdille's first successful fenestration George E. Shambaugh, Jr. gives an interesting review of the past history, present techniques, and future possibilities of the operation. Great credit is given to Lempert for his outstanding contributions. Research work which led to a markedly reduced incidence of osteogenic closure is outlined. The limitation

in the amount of hearing that can be restored is stressed as well as the apparent improvement in bone conduction after surgery.

Future work must be directed toward reducing the incidence of postoperative labyrinthitis, and the evaluation of long term results on large series of cases is important. It is too early to evaluate the place of mobilization of the stapes in the treatment of otosclerotic deafness. —*John R. Lindsay, M.D.*

NOSE AND SINUSES

Malignant Lesions of the Nasopharynx. SIDNEY H. DUBOE. *Arch. Ophth.*, Chic., 1955, 61: 135.

THE DIAGNOSIS of lesions of the nasopharynx is often late for three reasons: (1) failure of the lesion to produce local symptoms, (2) failure of the physician to examine the nasopharynx, and (3) difficulty in visualizing the nasopharynx. Malignant tumors are three times as common in the nasopharynx as benign tumors and make up about 2 per cent of all malignant growths of the head and neck. There is an unexplained high incidence among the Chinese. In Hongkong it is the second most common malignant disease. The prognosis is generally poor.

The author quotes a 5 per cent 9 year cure in carcinoma and a 20 per cent cure in sarcoma, as reported by Gotfredson. The treatment is carried out by the radiologist and the cases are followed up jointly with the otologist.

Four illustrative cases are presented.

—*John R. Lindsay, M.D.*

PHARYNX

Bacteremia Following Tonsillectomy; Effect of Preoperative Treatment with Antibiotics in Postoperative Bacteremia and in the Bacterial Content of the Tonsils. PAUL S. RHOADS, JOHN R. SIBLEY, and CARL E. BILLINGS. *J. Am. M. Ass.*, 1955, 157: 877.

THIS STUDY was undertaken to investigate the presence of a transient bacteremia after tonsillectomy that is similar to that observed after tooth extraction, as well as its prevention by preoperative treatment with penicillin and other antibiotics. Information was sought regarding the bacterial content of the deeper lymphoid tissues of the tonsil obtained by culture from the surface of the throat, and an effort was made to determine how antibiotic therapy affects the bacterial content of the deeper structures of the tonsil.

The incidence of postoperative bacteremia of a temporary character was 28.3 per cent in the persons undergoing tonsillectomy who had had no preoperative antibiotic therapy. The incidence of bacteremia was reduced to 5.9 per cent in a group of 20 subjects who received penicillin in a daily dose of 600,000 to 800,000 units intramuscularly for 4 to 10 days prior to tonsillectomy.

The incidence of bacteremia in a group of 29 patients who received 600,000 to 800,000 unit doses (half this dose for children) of procaine penicillin 12 to 18 hours and 1 hour prior to tonsillectomy and in a small group (7) of patients receiving 900,000 to 1,200,000 units orally daily for 5 to 7 days prior to operation was not reduced below that of the control group.

Beta hemolytic streptococci were obtained from blood cultures four times, pneumococci 1 time, alpha hemolytic streptococci (green forming) or gamma anhemolytic streptococci 28 times, and a combination of beta hemolytic streptococci and gamma anhemolytic streptococci 2 times. The need for several days, preoperative treatment with penicillin to prevent posttonsillectomy bacteremia is emphasized. Cases have been cited in which the relationship between posttonsillectomy bacteremia and the onset of acute bacterial endocarditis and septicemia appeared to be quite direct.

—*John H. Mohardt, M.D.*

NECK

The Postoperative Crises of Hyperthyroidism (Le crisi postoperatorie degli ipertiroidei). G. FOJANINI and A. CONTI. *Arch. ital. chir.*, 1955, 79: 29.

SEVEN INSTANCES of thyroid crises from the surgical department of the University of Rome, Italy, are reported. These were part of a total 15 year thyroid operative material of 177 cases. There were 3 women and 4 men; all had severe cases of Basedow's disease and were subjected to varying, usually adequate, periods of preoperative preparation by classic methods (rest, iodine, later thiouracil, sedatives); nevertheless these crises developed, at times under circumstances in which the basal metabolism, pulse rate, and general condition of the patient might be considered within the normal range of variation. In 2 instances the crisis developed during the postoperative treatment with the lytic cocktail of Laborit (hibernation); in 1 of these patients death occurred after a 3 day period of apathetic crisis. The other patient had the erethistic type of reaction, the same reaction of all the other patients in this group. This patient and 3 others recovered; there was a total of 3 deaths, a mortality of 43 per cent.

The authors do not believe that the operation is the *sine qua non* for the development of the postoperative crisis; in particular they question the plausibility of the theory, as the condition by-passes a large majority of patients with a clinically similar symptomatology and strikes an individual only here and there (less than 4 per cent in all thyroidectomies here reported).

Therefore the authors have been seeking some other cause or causes for the development of the catastrophe, and they have come to accept the implications presented by the hypothyroxinemic theory, as proposed by Mahaux, among others, in INTERNAT. ABSTR. SURG., 1946, 83: 230. Mahaux notes that thyroid crisis cannot be produced by injections of thyroxin, while others have repeatedly reported the production of this condition by injections of the thyreotropic hormone of the anterior lobe of the hypophysis.

Working on the hypothesis, therefore, that an acute hypothyroxinemia may be the motivating cause of thyroid crisis, the authors have been using the injection of thyroxin as a therapeutic procedure in thyroidectomy cases. Thyroxin, of course, is the physiological inhibitor of the diencephalohypophysial component, the activity of which is expressed in the production of the thyreotropic hormone. In fact, the authors note that the postoperative crises in these patients with Basedow's disease develop more frequently when the

diencephalohypophysial symptoms (exophthalmos, goiter, agitation) are more marked in the individual patient. The present procedure is to administer thyroxin in amounts adjusted to the apparent need of the patient immediately after the operation, that is, in a quantity sufficient to keep down to normal the glycemia which always tends to rise (Berger, Colson, etc.). On this same day iodine is also given, either intravenously or, when possible, orally.

Recently, instead of the iodide salt, the authors have been using the new preparation combining the actions of iodine and of thiouracil (2-thio-5-iodo-uracil).

Of course, glucose solutions are administered to the dehydrated fever patient, and cardiotonics and chinidine are given when indicated. Other such supplemental preparations are procaine amide and vitamin C. The vitamin C administration is resorted to because of its potentiative effects when used in combination with the thyroxin in inhibiting the production of the thyreotropic hormone.

The afore-cited medical regime is continued as long as there appears to be any danger of the development of the crisis, and in the instances in which such crises do develop, the medication is continued until the temperature and the tachycardia have returned to normal values. This medical regime has now been in use on the authors' service for the past 6 months and during this time they have not experienced a single instance of thyroid crisis. —*John W. Brennan, M.D.*

Carcinoma and Thyroid Nodules; the Problem in an Endemic Goiter Area. J. MARTIN MILLER. *N. England J. M.*, 1955, 252: 247.

PREVIOUS SERIES reporting the high incidence of carcinoma in nontoxic nodules of the thyroid gland are open to question for numerous reasons. Most of such reports originate in surgical centers where a high proportion of cases are referred because of the suspicion of malignancy. The many nodular goiters seen by the referring physicians, but not referred to the clinic, are thus omitted from such statistics, and the percentage of malignancy in these is perhaps only a fraction of a per cent. Since these high percentages include cases in which cancer was suspected or diagnosed preoperatively, they do not reflect the true incidence of unsuspected cancer in nodules which appear benign clinically.

The frequency of thyroid nodules 2 cm. or greater in size in a group of 600 adult women was 4.5 per cent. From this ratio, it was calculated that in 300,000 nonobstetric and nonpediatric admissions to this clinic in a 10 year period, there would have been 9,000 patients with at least one nodule 2 cm. or greater in size. This size is selected because most general surgeons would accept it as an indication for surgery.

During the same 10 year period, 435 thyroidectomies were performed for nontoxic nodular goiter, and 16 cases of unsuspected cancer were found, an incidence of 3.7 per cent. There was also 1 unsuspected cancer found in a toxic nodular goiter, and 15 other thyroid cancers, in which cases the preoperative diagnosis was cancer or cervical adenopathy.

When the figures of total nodular goiters seen and of unsuspected carcinomas found are combined, an incidence of only 0.2 per cent of malignancy would be expected. This figure is in error since it assumes that all nodular goiters not operated upon were benign. Since the total thyroid cancer seen is so small, however, the true statistical incidence is unlikely to be much greater than 0.4 per cent.

In the 10 year survey period, 8 deaths from thyroid cancer were recorded. If all thyroid nodules 2 cm. or over were operated upon during this period, 9,000 patients would have undergone surgery with an apparent maximum saving of less than 1 life per year. In this endemic goiter area, removal of thyroid nodules in search of unsuspected cancer would appear to be clinically and economically unsound.

—*Stanley W. Tuell, M.D.*

Malignant Parathyroid Tumors (Il paratiroidoma maligno). A. BISSI and M. GAETANI. *Tumori*, Milano, 1954, 40: 609.

THE AUTHORS, in reviewing the literature on carcinomas of the parathyroid, decided that only 37 of those studied met the necessary criteria to be actually considered such. Of this group of 37 about 20 were found to have metastasis to either the lymph nodes, bones, or lungs. Some of them were nonfunctioning, but lack of function does not exclude the diagnosis. Most of the patients, however, presented themselves with symptoms referable to hypercalcemia or the osseous system, while only a few had local neck symptoms. Nonfunctioning tumors generally have a prolonged clinical course while functioning tumors have a short one.

The case of a 50 year old white man with a carcinoma of the parathyroid and widespread osseous metastasis was presented. This patient died within 4 months of establishment of the diagnosis and autopsy showed widespread metastasis to the bones.

—*Alexander J. Conte, M.D.*

Borderline Malignant Lesions of the Larynx. F. JOHNSON PUTNEY. *Arch. Otolar.*, Chic., 1955, 61: 381.

CERTAIN BENIGN LESIONS of the larynx have potentialities for malignant change. Many of these deteriorate when exposed to chronic irritants, of which tobacco is the chief offender. It behooves the laryngologist to find, follow, and treat such premalignant lesions.

Laryngeal keratoses which are irregular, papillary, or inflamed are more likely to be malignant than other forms. If keratoses do not disappear after several weeks of treatment to eliminate irritants, they should be removed or destroyed by x-irradiation.

Carcinoma in situ is now a pathological entity. It may appear in a normal cord, in a keratosis, or in a seemingly benign polyp. It may remain superficial for long periods of time, or it may become invasive within a few weeks after it begins. If invasion occurs, treatment must be as radical as the extent of the disease indicates. If the lesion is superficial simple excision through a thyrotomy is recommended. Electrosurgical removal via the laryngoscope or irradiation therapy may be successful. Both have been advocated by others.

Salivary gland type of tumors of the larynx tend to have more malignant characteristics in the larynx than do the similar pleomorphic mixed tumors within the salivary glands. The author considers them as low grade adenocarcinomas, and treats them by wide and

radical excision. The operator should not be misled by false impressions of encapsulation.

About 5 per cent of the 501 papillomas of the larynx here reported were associated with carcinoma, in 9 of which a cancer developed from a pre-existing papilloma. Malignant change has been reported even in juvenile papillomas. Complete and accurate biopsy often is difficult, and permanent cure of simple papilloma is unsatisfactory. Careful protracted observation of recurrences and repeated biopsies of recurrences should be made. Surgical excision is better than roentgen therapy. When carcinoma does develop, usually it occurs as multicentric invasions. Laryngectomy then is the necessary treatment. Antibiotic and hormone therapy have little effect on the recurrence rates of papillomas. —*Leonard D. Rosenman, M.D.*

Cancer of the Larynx (Il cancro della laringe). PAOLO CARCÒ. *Fracastoro*, 1954, 47: 1.

THE AUTHOR discusses his personal experiences with, and observations on, the diagnosis, spread, and therapy of carcinoma of the larynx. The etiological factors that have been considered causative agents in carcinoma of the larynx are multiple. Less significance is being attached to the microtraumas and irritation from tobacco that were previously accepted. Tobacco may act as a causative agent by inducing a general intoxication from the nicotine content. More importance is being given to repeated chronic inflammatory processes of the laryngeal mucosa. The hyperplastic epithelial changes represent ideal conditions for the development of an epithelioma. Recurrent episodes of chronic nonspecific catarrhal laryngitis is a characteristic history observed in these cases. The causative agents responsible for the transition have not yet been determined. Statistical analysis shows a progressive increase in the number of cases of cancer of the larynx reported in various parts of the world. This increase, however, is relative and due to increased diagnostic aids and less mortality from other causes.

The statistics show, however, that this disease is seen almost exclusively in males. It occurs between the fourth and sixth decades and has a more malignant course in the younger age group.

Microscopically, the tumors may present themselves as vegetative, infiltrating, or ulcerative lesions. Epitheliomas may assume a papillary appearance. This type of tumor is seen more commonly in the vocal cords while the infiltrating form is usually seen in the supraglottic and infraglottic area. Microscopically, the most common appearance is that of a spindle cell epithelioma. Less frequent is the basal cell carcinoma. The site of the tumor is important when one considers metastatic spread. Carcinoma of the vocal cords has a more favorable prognosis in view of the poorly developed lymphatic drainage and the rare development of distant metastatic lesions. Tumors of the vestibule, larynx, and subglottic space, on the other hand, may show rapid lymphatic spread. The authors are of the opinion that in the cases in which metastatic spread is suspected, radical laryngectomy should not be performed until an adequate examination has ruled out the presence of distant metastases. If distant metastases are found, then radical laryngectomy is contraindicated. The author does not share the opinion that radical laryngectomy should be done even with distant metastases, to delay growth of the metastatic lesion.

Treatment of such conditions is necessarily surgical. Radical resection of the larynx with systematic dissection and resection of the lymphatic chain should be done. This is indicated particularly in that microscopic metastasis may exist in the jugulodigastric recessus which cannot be detected by physical means of examination. Resection of tumors of the larynx, exclusive of those of the vocal cords, should be followed by a course of postoperative roentgen therapy. Preoperative roentgen therapy is sometimes indicated when histological examination reveals a tumor of high malignancy. Early diagnosis and treatment is imperative for a good prognosis.

With improved surgical technique and the use of antibiotics, the procedure of radical laryngectomy with lateral cervical lymph gland dissection can be satisfactorily accomplished. A very important part of therapy is directed at informing the patient of the loss of voice and of the planned course of speech therapy directed at the development of esophageal speech that will follow surgery. This information should also be given to the patient's immediate family.

The author thus concludes that the outlook on cancer of the larynx has radically changed in view of two important developments: the perfected techniques of radical laryngectomy and the excellent results accomplished by esophageal speech therapy.

—*Roland A. Manfredi, M.D.*

Carcinoma of the Larynx and Its Present-Day Management. FREDERICK A. FIGI. *Ann. Otol. Rhinol.*, 1955, 64: 136.

CARCINOMA OF THE LARYNX can be cured in an appreciably higher percentage of cases than that at present if the lesions are diagnosed in an earlier stage. Although patients with this condition are now consulting laryngologists more promptly than a decade or two ago, in a number of them the process is already well advanced at the time of their initial visit. Many of them require radical surgical treatment which might well be avoided if the physician consulted primarily suspects the serious nature of the laryngeal lesion. Most of these neoplasms develop on the vocal cords, and a change in the quality of the voice or persistent hoarseness generally occurs early. Accordingly, keener appreciation of the possible significance of chronic hoarseness by the physician and the laity will improve the present situation. Continued education of the public in this connection, too, will help, but it is essential also that the physicians maintain a high degree of suspicion regarding this condition.

The most important diagnostic measures are a detailed clinical history, painstaking and thorough indirect or mirror examination of the larynx after cocainization, if needed, and biopsy. Adjuncts are routine laboratory studies including urinalysis, blood count, roentgenographic examination of the thorax, serologic test for syphilis, and, if indicated, examination of the sputum. A general physical examination should be carried out routinely. Direct examination of the larynx with a laryngoscope or the suspension apparatus often will yield additional information. A specimen can be removed from the most suspicious portion of

the lesion at the time of the direct inspection. It should be emphasized that a report of inflammatory tissue on a specimen from a lesion that looks malignant clinically demands that further histologic study be carried out. In lymphosarcoma of the larynx repeated biopsies are at times required for diagnosis, and it may be necessary to delay the removal of tissue for several weeks to permit the inflammatory reaction to subside. Experience has shown that no harmful effects result from biopsies provided that the procedure is properly performed. It is essential that trauma be minimal and it is advantageous to have the surgeon who is to remove the lesion remove the specimen.

The therapeutic measures of value include thyrotomy, total laryngectomy, hemilaryngectomy or partial laryngectomy, pharyngotomy, endoscopy, and irradiation. Exploration through thyrotomy often is necessary to determine the extent of the malignant process and the best means of removal. Many lesions in the supraglottic portion of the larynx can be eradicated with suspension laryngoscopy and electrocoagulation. By means of partial laryngectomy or hemilaryngectomy and immediate skin grafting, some moderately advanced carcinomas with varying degrees of fixation can be cured without disturbing laryngeal function.

Acute Obstruction of the Upper Respiratory Tract. DONALD E. MCDOWELL and WALTER H. MALONEY. *Arch. Otolar.*, Chic., 1955, 61: 29.

THE AUTHORS present the various causes of acute upper respiratory tract obstruction, as well as cases illustrative of the commoner causes. A survey was made of the cases in which tracheotomy was required for acute upper respiratory tract obstruction in the moderate-sized general hospital during a 5-year period. The need of a receiving ward and of a staff prepared to recognize and to treat the various acute obstructions of the upper respiratory tract is emphasized.

Emergency tracheotomies for upper respiratory obstruction were performed in 7 cases of laryngotracheobronchitis, 4 cases of cancer of the larynx, 2 cases of fracture of the mandible, and 1 case each of coma, cancer of the thyroid, rupture of the trachea, mediastinal and cervical emphysema, neck abscess, and retropharyngeal abscess—a total of 19 cases.

The authors believe that one should err on the side of too early and too many tracheotomies rather than too late and too few. They believe that some of their emergency tracheotomies should have been elective orderly tracheotomies. The field of usefulness of tracheotomy is continuing to widen.

—*Robert Turell, M.D.*

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Clinical Observations on 900 Cases of Recent Craniocerebral Trauma (Considerazioni cliniche su 900 casi di traumi cranio-cerebrali recenti). Angelo Acquati. *Gior. ital. chir.*, 1955, 11: 1.

IN THIS ARTICLE, the author reports on a series of 902 craniocerebral injuries observed during the period from 1941 to 1954. In these cases were 29 compound wounds of the skull. There has been a progressive increase in the number of head injuries for a number of years which the author attributes to the greater number of automobiles in daily traffic. Of the patients, 60 had associated fractures of other parts of the skeleton. The mortality rate for the entire group was 22 per cent, with an incidence of 51 per cent for the compound wounds of the skull. Six hundred and fifty-five of the cases were due to traffic accidents with bicycles, automobiles, and motorcycles. They were divided into five groups based on the severity of the intracranial injury as evaluated by the clinical examination. In the first group were the patients that manifested cerebral concussion. These patients manifested some disturbance in the state of consciousness immediately following the accident, accompanied by retrograde amnesia, stupor, headache, emesis, transient absence of the tendon reflexes, rapid pulse, superficial respiration, and altered sensibility. All of the patients showed a complete reversal of symptomatology, except for the retrograde amnesia, within 24 hours of injury, and were discharged from the hospital within 4 to 5 days. Four hundred and twenty patients (48%) with cerebral concussion were seen in this group, of whom 79 showed roentgenological evidence of skull fracture. Spinal fluid examination of these patients revealed clear, colorless fluid under normal pressure. There were no deaths in this series.

The second group of patients were those with cerebral concussion and evidence of increased intracranial pressure. In these patients, alteration of the state of consciousness was accompanied by periods of psychic agitation, confusion, and disorientation. Headache was prominent, and it was characteristic of these patients to show periods of stupor interrupted by periods of agitation. The patients would usually return to normal after a period of a few days. Spinal fluid examinations revealed an elevated spinal fluid pressure with xanthochromia. Except for the xanthochromia, the microscopic and chemical analysis of the fluid were normal. The author interpreted this finding as being due to an alteration of the hydrodynamics at the cerebromeningeal level. The patients remained hospitalized for a period of 10 to 15 days, following which there was complete reversal of their symptomatology. In this group there were 153 (17.5%) patients, and there were 59 in whom there was roentgenologically demonstrated evidence of skull fracture. There were no deaths in this group.

Patients with cerebral concussion and meningocerebral lesions comprised the third group. In these cases, the altered state of consciousness persisted beyond 24 hours, and spinal fluid puncture revealed grossly hemorrhagic fluid under increased pressure. The patients sometimes showed an initial bradycardia, elevations of temperature, and loss of sphincter control. The state of coma persisted for a period of days, following which there was an irregular pattern of recovery of consciousness with prolonged disorientation, agitation, prolonged amnesia, and intense cephalalgia. The authors observed that the pupils were initially dilated and reacted normally to light. There was a transient state of diffuse muscular rigidity. Following recovery, there were no specific signs of neurological deficit. The author thinks that these changes were due to rupture of the cortical blood vessels with localized areas of circumscribed hemorrhages and contusions. Fractures were demonstrated in 63 of these cases. Twenty-seven patients died in this series.

In the fourth group were 5 cases which presented evidence of increased intracranial pressure following a clear interval. In this group, the author described 2 typical patients who on initial examination were alert and co-operative although they evidenced some disturbances of amnesia. After a period of observation, it was noted that there were unilateral pupillary changes associated with the development of hemiplegia. Two of the cases described at autopsy examination showed typical extradural hematoma. The author concludes that it is difficult to differentiate these cases clinically from those of cerebral contusion. Spinal fluid examination revealed clear or bloody spinal fluid under increased pressure. All 5 of the patients in this group died.

In the fifth group were the cases that were described as severe nonreversible cerebral coma. Clinically, the patients had profound coma, areflexia, mydriasis, a rapid weak pulse, irregular respiration, hypotension, and a profuse diaphoresis. Examination of the cerebral spinal fluid usually showed gross blood and hypertension. The patients usually showed extreme variation in temperature, and death usually occurred within the first 24 hours. One hundred and fifty-four (17%) cases of this type were seen. All of the patients died within the first 24 hours.

Therapy in this entire series of cases was medical, with surgical intervention only when compound injuries of the calvarium with evidence of intracranial depression or foreign bodies were found. The author is of the opinion that, together with supportive treatment, repeated spinal puncture is directly responsible for the rapid clearing of symptomatology in cases of increased intracranial pressure. This procedure was more helpful in the patients who had not only increased intracranial pressure but gross blood in the spinal fluid. The author adds, however, that in cases of severe head injury, therapeutic spinal puncture did not give improvement in the patient's condition. Spinal puncture is repeated at daily intervals or more frequently if the patient's condition shows any signs of worsening, and approximately 10 to 15 c.c. of

spinal fluid are removed with control by manometry to return the pressure to normal.

—*Roland A. Manfredi, M.D.*

Actinomycosis of the Brain; Report of a Successfully Treated Case. A. P. BARTER and M. A. FALCONER. *Guy's Hosp. Rep.*, Lond., 1955, 104: 35.

A CASE in which a large multilocular actinomycotic abscess was successfully excised from the right temporal lobe is reported. No evidence of the disease could be found in any other site. The patient was a Chinese woman, aged 22, with the initial symptom of right frontoparietal headache followed by aching central abdominal pain, vomiting, neck stiffness, and photophobia. A pyogenic meningitis was suspected on the basis of the initial examination, and penicillin and aureomycin were given while awaiting the result of culture of the cerebrospinal fluid, which proved to be sterile. Tuberculous meningitis was considered in spite of a polymorphonuclear pleocytosis so that the patient also received streptomycin.

Following biparietal ventriculography and right carotid arteriography the diagnosis of right temporal lobe abscess seemed likely. Exploration of the temporal lobe with a brain needle yielded thick greenish pus. Penicillin and thorotrast were left in the abscess cavity. As the patient's condition did not improve as anticipated, the possibility that the abscess was multilocular was considered and a right lateral craniotomy was performed. A large multilocular temporal abscess was found and completely removed. There was no evidence of an otogenic lesion. Microscopically, a smear of pus from the abscess showed numerous colonies of Streptothrix actinomyces. Bacteriologic studies including anaerobic culture yielded an organism resembling Actinomyces bovis (Israeli).

The patient's postoperative progress was satisfactory apart from a severe left flaccid hemiparesis, which improved slowly. Later she developed a depressive illness with paranoid ideas and was transferred to a psychiatric hospital. Efforts made to demonstrate a primary focus of actinomycosis were fruitless. Roentgenographs of the mastoids, teeth, and chest were normal. Barium studies showed a normal ileocecal region and appendix. Swabs from the throat and ears were negative.

The diagnosis of isolated actinomycotic brain abscess is not easy. The condition should be borne in mind in instances of nonbacterial pyogenic meningitis, particularly if accompanied by a polymorphonuclear leucocytosis. The literature on actinomycosis of the central nervous system is reviewed with particular reference to possible routes of invasion. Five previous cases of successful treatment of actinomycotic cerebral abscess are noted. —*John L. Lindquist, M.D.*

Combined Surgicoradiation Management of Multiform Glioblastoma with Radioactive Cobalt Co^{60} (Eine kombinierte chirurgisch-radiologische Behandlung bei Glioblastoma multiforme mit radioaktivem Kobalt Co^{60}). E. KLAR, J. BECKER, and K. E. SCHEER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 280: 55.

IN 34 CASES of malignant brain tumors the authors have employed contact radiation in conjunction with surgical extirpation of the growths. There were 28 cases of multiform glioblastoma in the series.

Their method consists of electrosurgical removal of the tumor as widely as possible, following which the wound cavity is inlaid with 20 to 25 radioactive cobalt pearls strung alternately with pearls of inactive plexiglas on a thread. The dura is then closed and the free end of the thread is brought out through superimposed openings in the dura, bone, and skin. After 20 to 24 hours, depending on the calculated dosage desired, the string of pearls is withdrawn. There is no necessity to remove sutures from the wound. The small wound left for the extraction of the pearls is closed with one or two sutures after the instillation of 2 c.c. of penicillin solution.

Infection did not occur in any case. The postoperative course of these patients was significantly more favorable than that of 8 patients who had surgery alone. The most striking feature of the postoperative course was the absence of brain edema. The follow-up period has not been long enough to permit a final evaluation of the results but the mean survival time of the patients treated with combined surgery and contact radiation has significantly exceeded the 6 to 8 months generally estimated for patients with glioblastoma. —*John L. Lindquist, M.D.*

SPINAL CORD AND ITS COVERINGS

Acute Spinal "Epiduritis" (Las epiduritis espinales agudas). P. PERALTA and J. V. ANASTASIO. *Cirugia*, Madrid, 1954, 1: 47.

REFERRING to what in this country we are more apt to call spinal epidural abscess, these Spanish authors speak of "spinal epiduritis," and integrate a rather complete review article on the subject. They present 3 cases of their own.

"Specific" epiduritis includes, by their criteria, only the acid-fast and luetic granulomas. Their article, however, is concerned with the "nonspecific" varieties, which may arise by direct infection via a penetrating wound or spinal puncture, by extension of a contiguous septic focus, or by hematogenous or lymphogenous spread from a distant infection. In the latter group the authors distinguish the focus of origin as apparent (tonsillitis, thrombophlebitis, osteomyelitis) or nonapparent, in which case the organism, ordinarily in a nonpathogenic status in various loci of the body, becomes lodged in the epidural space by hematogenous spread under the stimulus of a stress factor which depresses the resistance to infection, such as exposure to low temperatures or trauma. In their review, the most common causative organism (over 75 per cent) was one or another variety of the staphylococcus.

The pathology is typified by a more or less circumscribed inflammatory reaction in various stages. The changes in the cord, if any, are of the order of a degenerative malacia (compression ischemia) and seldom the product of direct infection. Spontaneous drainage along the psoas or intercostal spaces is a rarity, but occasionally it is followed by cure.

In the clinical picture intense root pains and paresthesias, as well as paravertebral muscle spasm, occur early and are characteristic. Evidences of the primary infection are to be searched for, even though sometimes already apparently cured. Fever is usually sus-

tained. Leucocytosis and an elevated erythrocyte sedimentation rate are the rule. Signs of transverse cord damage ensue later with rapid evolution, most often ascending, and associated with meningism.

The hazard of infection of the theca due to lumbar puncture in an established case is negligible. The fluid is likely to show a mild pleocytosis and, if a block exists (as is frequently the situation), the chemical and manometric alterations *de rigueur* would be demonstrable. Plain roentgenography is seldom helpful, myelography is not recommended (reasons not stated), and the epidural injection of contrast media is contraindicated.

The authors conceive of the use of specific antibacterial drugs simply as coadjuvants to the inevitable, immediate, orthodox decompressive laminectomy in the fully developed cases, especially after medullary compression obtains. If untreated, the disease is almost always fatal. If the affected area is too long to be fully decompressed, cephalad and caudad epidural irrigation with a small catheter and antibiotics should be essayed. The rare instances of multiple epidural foci may be decompressed and drained separately by small laminectomies, or a long laminectomy may be performed to include the adjacent ones. Although decompression and drainage are looked upon as the goal of the surgeon, the writers do not specifically mention whether or not a drain should routinely be left in, or the wound allowed to granulate.

Of their 3 cases, 1 developed 11 days after lumbar puncture for anesthesia, complete paraplegia developing on the fourteenth day. This patient expired before proposed laminectomy. The second case was secondary to furunculosis, with low thoracic medullary compression and paraplegia; complete recovery followed laminectomy, when a rubber drain had been left in. The third case was attributed to a distant focus (bronchitis) and the neurologic evolution was slower, eventuating in a fairly complete paraplegia at a high thoracic level. The operative findings of organized fibrous granulation and small abscesses were dealt with by drainage and excision. The dura was opened and the cord found atrophic; the dura was left open. The patient recovered sufficiently to return to work in 6 months. —*Juan E. Fonseca, M.D.*

The Early Diagnosis of Spinal Tumors. H. J. G. Bloom, H. Ellis, and W. B. Jennett. *Brit. M. J.*, 1955, 1: 10.

The authors analyze a series of 36 verified cases of spinal cord tumors observed at the Military Hospital for Head Injuries at Oxford, England from 1944 to 1951. The series included 15 neurofibromas (4 cervical, 5 thoracic, 6 of the cauda equina), 8 metastatic tumors of the thoracic spine, 3 ependymomas of the cauda equina, 3 gliomas of the thoracic region (2 histologically unverified), 2 giant cell tumors of the bone, 1 primary malignant melanoma of the C3 root, and 4 angiomas. Six of the 8 metastatic tumors were histologically suggestive of bronchial origin.

The most common symptom was pain, which occurred in 29 cases and was experienced as root pain or dull central backache. Loss of motor power following sensory disturbances occurred as initial symptoms and led to the diagnosis of poliomyelitis in 3 cases. Complete retention or incontinence of the urine or feces was found to be a late manifestation. However, increasing constipation or some difficulty in micturition was commonly seen. In 16 cases the roentgenograms of the spine were suggestive of spinal cord tumor and showed gross destruction, erosion of the pedicles and laminae, widening of the intervertebral foramina, or scalloping of the posterior aspects of the vertebral bodies. Myelography was used for final localization in 22 cases. Lumbar puncture revealed an abnormality in every case, such as partial or complete manometric block, xanthochromia, or raised cerebrospinal fluid protein. Partial or complete manometric block was found in 26 cases while a rise in total protein was found in 35 of the cases. Xanthochromia was present in 16, while in most patients the cell count was not increased. In the authors' experience, lumbar puncture was carried out with little risk; however, they think that with cervical cord tumors the puncture may precipitate respiratory paralysis.

At one time or another incorrect diagnoses were made in 28 of the patients. The diagnoses were fibrositis and rheumatism, prolapsed discs, sciatica, neuritis, hysteria, neurosis, disseminated sclerosis, and poliomyelitis. Temporary remissions of pain may simulate the disc syndrome. However, in most cases spinal fluid studies settled the problem. The diagnosis of fibrositis or rheumatism was usually made when the patient complained of back pain alone. Extradural abscess seemed to be commonly simulated by metastatic tumors.

The authors advocate laminectomy as soon as the diagnosis is established and the location determined. Complete removal of the tumor is the ideal procedure and is usually possible in cases of neurofibroma. The remaining tumors were only partly removed; however, the spinal cord was decompressed. Some tumors were treated by radiotherapy. Incomplete removal followed by radiotherapy gave a satisfactory immediate recovery in 2 cases of ependymoma of the cauda equina. One operative death was due to aspiration pneumonia. The average delay between the first consultation and the operation was 6.4 months.

—*George Perret, M.D.*

SYMPATHETIC NERVES

Effect of Exercise on Muscle Blood Flow in Normal and Sympathectomized Limbs; Collateral Circulation Before and After Sympathectomy. Peter Beaconsfield. *Ann. Surg.*, 1954, 140: 786.

The increase in flow during reactive hyperemia in sympathectomized limbs depends on a great number of variables: the state of the vascular tree in general, the elasticity of the blood vessel wall, the age and general condition of the patient, the stage of development of peripheral vascular disease, and the extent of the operation. Spontaneous improvement in the efficiency of the collateral circulation and response to exercise after the establishment of an arterial obstruction ceases about 12 to 18 months after complete arterial obstruction has been established. In a series of 26 patients, the author verified the level and extent of the arterial occlusion with aortograms or arteriograms, and he measured the muscle blood flow with the plethysmograph. Experiments were conducted while the

patient performed rhythmical contraction of the calf muscle for 2 minutes. The author studied 2 patients with hyperhydrosis, 3 with thrombosis of the aortic bifurcation, 4 with thrombosis of the common iliac artery, 9 with femoral thrombosis, 2 with popliteal thrombosis, 2 with anterior tibial thrombosis, 2 with posterior tibial thrombosis, 2 patients with generalized arteriosclerosis without active block, and 6 normal subjects.

In normal subjects he found that the blood flow was maximal immediately after the end of the exercise, rising from 2.2 ml. /100 ml. of tissue per minute to 19.8 ml. /100 ml. of tissue per minute, and it returned to normal blood flow in 3.5 minutes. Following sympathectomy in normal patients, no noticeable changes occurred. In the cases of thrombosis of the aortic bifurcation, the mean resting calf blood flow was slightly increased following sympathectomy and increased from 1.3 ml. /100 ml. of tissue per minute to 3.7 after exercise. There was delay of 1 minute between the end of the exercise and the peak blood flow, and the time required for return of the blood flow to normal was more than 20 minutes. The blood flow was not increased 4 months following sympathectomy in the 4 patients who had common iliac thrombosis. However, it was definitely improved after sympathectomy in the cases of femoral thrombosis. One patient who did not show sufficient improvement was given a venous graft to relieve the obstruction 6 months after sympathectomy, following which his blood flow increased from 7 ml. to 13 ml. and remained at this level. No improvement was seen following sympathectomy in 2 patients with popliteal thrombosis. The 4 patients with peripheral thrombosis showed some improvement 4 months after operation. There was also definite improvement in the blood flow in 2 patients with generalized arteriosclerosis but no arterial block. Improvement in the return of the calf blood flow to resting level after exercise was found to be significant only in patients with femoral thrombosis, peripheral thrombosis, or generalized arteriosclerosis.

In acute obstruction, the abolition of the sympathetic control speeds up the development of the collateral circulation by decreasing the peripheral resistance, allowing an increase in the arterial flow and causing enlargement of the collateral vessels. When the main arterial trunk is occluded the velocity of the blood flow through collaterals is also increased. It is thought that the decrease of the vasomotor tone of the small blood vessels together with increase in the rapidity of blood flow speeds up the development of collateral vessels. In patients in whom the arterial obstruction is gradual, as in arteriosclerosis, the collateral vessels develop slowly and are fully developed in most instances long before the patient seeks medical advice. Sympathectomy will not increase the collateral circulation although it may abolish superadded elements of spasm. Sympathectomy effects an improvement in postexercise hyperemia in patients with arterial block provided the anatomical arrangement of the obstruction permits the development of large collateral vessels, and these vessels retain an ability to dilate. Thus, the limbs with common iliac or popliteal thrombosis showed no increase in active hyperemia after lumbar sympathectomy because the position of the arterial block did not permit the development of major collaterals as is the case with femoral or peripheral thrombosis. It seems that in younger patients subject to arterial occlusion, the wall is still capable of dilating if sympathectomy is performed early in the disease and the development of collateral vessels may be accelerated and becomes manifest roentgenologically as well as clinically. However, the pathological process continues to progress. Sympathectomy does not at any time stop the development of the underlying disease. —*George Perret, M.D.*

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Cystic Disease of the Breast. HERBERT H. DAVIS and MILTON SIMONS. *Arch. Surg.*, 1955, 70: 414.

THE AUTHORS base this study on 289 cases of cystic disease of the breast in which operation was performed by Davis in the period from 1938 to 1953. Local excision, mainly removal of the lump with only a small amount of breast tissue about it, was done in 266 cases, or 92 per cent. Results are known in 201. With unilateral local excision, no further surgery was needed in 83 per cent. With local excision done bilaterally, the results were good in 75 per cent. Simple mastectomy, unilateral or bilateral, was done in 23 patients (8%) whose breasts were riddled with cysts. Recurrent cysts were reoperated on in 16 per cent and carcinoma developed in 1.86 per cent. Surprisingly, of 113 patients with hyperplasia of the duct epithelium, 84 per cent have had no further trouble.

In only 4 of the 215 cases in which the results are known did carcinoma subsequently develop. Two of these patients are known to be well, one is lost to follow-up, and only one is known to have died of carcinoma of the breast.

Apocrine epithelium was a very frequent finding in the cases presented in this study and did not seem to be important prognostically to the authors. Dilated mammary ducts were frequently found.

The authors feel that blunt-duct adenosis is an extremely frequent change in cystic disease of the breast.

Sclerosing adenosis is a specific lesion commonly misinterpreted and erroneously diagnosed as carcinoma. It occurs in 2 forms: in the first a palpable tumor mass is present; in the second minute focal areas are seen only on microscopic examination. The latter is much more common.

All degrees of hyperplasia may be found and occur alone or, more commonly, may be associated with other types of lesions. Theoretically, breasts with epithelial hyperplasia are the most likely to develop carcinoma.

The authors found that the number of cases with a single papilloma was too small to draw conclusions. In this study, the surprising fact came out that in more than four-fifths of the cases of the more common diffuse duct papillomatosis, considered precancerous by many, no further cysts developed. One of 51 patients developed carcinoma. Of all 69 patients with duct papillomatosis, 56 had only a unilateral local excision and 6 a bilateral local excision. In only 4 patients were unilateral simple mastectomies done. One of the patients had a previous carcinoma of the breast and later developed cystic disease of the opposite breast, for which one of the authors did a simple mastectomy. A bilateral simple mastectomy was performed as the primary operation in 3. In the 7 patients who were reoperated upon for recurrent cystic disease, a local excision was done in 2, a unilateral simple mastectomy in 3, and a bilateral simple mastectomy in 2. Of the group of 62 treated by unilateral (56) or bilateral (6) local excision, only one developed carcinoma.

In the last type, intraductal epithelial hyperplasia, which is the most dangerous, pathologists disagree as to which lesions are called benign intraductal hyperplasia and which carcinoma. In spite of the fact that local excision only was the procedure in two-thirds of the patients, 75 per cent had no further trouble. One patient with grade 3 hyperplasia who had local excision in 1946 developed recurrent bilateral cysts the following year and bilateral simple mastectomy was done. The patient is well at the present time.

There were 9 patients who had all 3 main types of duct hyperplasia, that is, papillomatosis, the apocrine type of epithelium with papillomatosis, and epithelial hyperplasia. In the 8 cases in which we know the results, there were no recurrences in 6, but 2 of the cases had occurred within the last 2 years. Recurrent cysts were found in the opposite breast in 2. None developed carcinoma.

Many of the 215 patients had several types of lesions, which makes determination of the exact factors in the results impossible. The authors feel that it is surprising how little the type of lesion influenced the results. —*Alan L. Dorian, M.D.*

The Problem of Prognosis in Cancer of the Breast. EDWARD F. LEWISON. *Surgery*, 1955, 37: 479.

THE PROGNOSIS in breast cancer is influenced by many factors in addition to the type of therapy. However, the effects of these influences are subtle and are often difficult to measure. Yet, if we are to carefully evaluate the best methods of treatment and to assess the survival results with accuracy, it is necessary to consider the natural history of breast cancer and to appraise as best we can the factors which influence its prognosis.

Most present day observers concur in the belief that an interval of time exists between the period of cancer onset and the ravages of cancer metastases. Current surgical strategy is based upon the concept that there is a stage when, apart from a few stray cells which may lie dormant within the embrace of the body defenses, the growth of malignant cells is confined to the breast and accessible regional nodes. The length of this interval of time prior to metastatic spread varies, and the precise period for each patient is, of course, unknown. One can never predict with certainty, therefore, that therapy will be either curative or hopeless.

This article presents a careful review and study of such clinical problems as duration of life in treated and untreated breast cancer, extent and advancement of this malignant disease, histologic grading, age, delay in diagnosis and duration of disease, and tumor size and site. Yet there still remains no unanimity of opinion regarding the reliability of each of the above factors as a valid index of prognosis. Each factor in prognosis is merely a straw in a wistful wind.

Cancer today gives no sure measure of cure tomorrow.

Tumors are known to vary greatly in their growth rate and in their tendency to metastasize early. The measure of earliness in time for the purpose of prognosis lies not alone in minutes or months but in malignancy and metastasis. This slender thread of time delayed, therefore, may mean that those patients who lose a day lose a life. The prognosis is primarily a balance between the malignant potential of the tumor cell and the biologic resistance of the host. Radical mastectomy, or even more extensive radical surgery, promptly performed will be life-saving only in those patients in whom the tumor has not yet spread beyond the confines of the field of operation. Thus, the prognostic significance and importance of axillary metastases (both presence and extent) or metastases to other accessible regional nodes are obvious.

The most important measurable factor in the prognosis of breast cancer is the presence and extent of axillary metastases at the time the patient is first treated. Age, duration of disease, size, and the site and grade of the tumor are all prognostic factors of secondary significance. Trauma, treatment, the effects of biopsy and delayed operation, pregnancy, and lactation have not been considered in this particular survey. The questionable influence of ovarian stromal hyperplasia on survival in both treated and untreated cases of breast cancer has been found to be negligible.

While some of these factors may be related to the alertness and understanding of the patient, and others to the diligence and initiative of the physician, the prognosis is largely dependent upon the rate of growth of the tumor and its tendency toward dissemination.

In the dilemma of prognosis, currents and cross currents of biologic behavior flow beneath the surface of unpredictable clinical speculation. The measure of these forces and their influence on survival cannot as yet be calculated with exactitude.

The Role of Simple Mastectomy in Treatment of Carcinoma of the Breast. BENJAMIN F. BYRD, JR., and DAWSON B. CONERLY, JR. *Ann. Surg.*, 1955, 141: 477.

A STUDY of 61 patients who were treated for carcinoma of the breast by simple mastectomy is presented. Radical mastectomy had not been carried out on this group of patients because of advanced age, a concurrent debilitating disease which resulted in an extremely poor physical condition, or because the carcinoma of the breast was so far advanced that it was believed to be incurable. Twenty patients (33 per cent) survived five or more years after simple mastectomy. Nine of these patients had lung or bone metastasis prior to surgery. If those without clinically demonstrable metastasis are considered separately there is a five-year survival of 77 per cent.

The effect of age on tumor growth is demonstrated in 20 patients in the age group from 70 to 80 years. There were 9 five-year survivals in this group. It is believed that this procedure saved several of these patients from a foul, ulcerating lesion of the chest wall.

Seventeen patients had carcinoma which clinically was confined to the breast. Many of these patients were inoperable according to Haagensen and Stout's criteria. Of this group, 13 patients (77 per cent) survived for five years. Only 5 patients in this series have died of carcinoma and only 1 patient died within five years of operation. Four of these patients have survived more than 10 years.

There were 29 patients who had axillary metastasis at the time of surgery and in this group the results were poor—a five-year survival of 17 per cent. No patient with evidence of distant metastasis survived more than five years. Most of the carcinomas in this group were far advanced and were thought to be inoperable. The majority of these patients were given postoperative radiation therapy.

This group of 61 patients who had been treated by simple mastectomy was then compared with 207 who had undergone radical mastectomy in the same period.

In the group having radical mastectomy for carcinoma without clinical axillary metastasis, the five-year survival is 76 per cent, while in the group having simple mastectomy for carcinoma without clinical axillary metastasis, the five-year survival is 77 per cent. In the presence of axillary metastasis, the five-year survival following radical mastectomy is 28 per cent, and following simple mastectomy, is 17 per cent. The over-all five-year survival of both groups, with or without axillary metastasis, is 43 per cent following the radical procedure and 38 per cent following the simple procedure. The authors attribute the lower than average over-all five-year survival of 43 per cent as due to the liberal criteria used in selecting patients for the radical procedure. —*John H. Davis, M.D.*

Tailhefer Incision for Carcinoma of the Breast (Incision de Tailhefer dans le cancer du sein; fascia péricellulo-ganglionnaire de l'aisselle). A. J. PAVLOVSKY. *Mem. Acad. chir.*, Par., 1955, 81: 188.

IN 1943, Pavlovsky described a fascial compartment in the axilla containing the lymphatics; its boundaries are formed by the clavipectoroaxillary fascia, fascia at the base of the axilla, and fascia covering the muscles of the axilla.

In 1928, Danis drew attention to the large lymphatic trunks running along the free axillary border of the pectoralis major, some of them right under the dermis. He advocated the removal of the skin overlying the pectoral border.

Tailhefer combined his incision with excision of axillary skin and has used it in 1,484 mastectomies. The transverse incision in the axilla should not encroach on the arm; the rest of the incision is at least 4 fingers from the palpable margin of the tumor. The incidence of postoperative edema of the arm is claimed to be less following the transverse axillary incision as compared with the more standard incisions. Inferiorly, the incision is rounded. The axillary closure utilizes the principle of Z-plasty. This type of closure facilitates an early full-range abduction of the shoulder. The customary undermining of the skin edges over the thorax usually permits a primary closure of the circular defect left after the mastectomy; the direction of the line of closure is chosen to permit the best utilization of the available skin. If there is not enough skin for a simple closure, a flap is rotated. Utilization of a flap permits a very wide resection. —*Leonid S. Cherney, M.D.*

So-Called Implantation Metastases After Operations for Mammary Carcinoma (Ueber sogenannte Impfmetastasen nach Brustkrebsoperationen). WALTER DICK. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 196.

THE AUTHOR, of the Surgical Department of the University of Cologne, Germany, discusses the question of so-called implantation metastases after mastectomy for mammary carcinoma. He criticizes the theory that cancer cells are implanted in the skin during the skin suture. As it is customary to change instruments and gloves after extirpation of the tumor and before doing the skin sutures it is difficult to conceive how cancer cells could get in contact with the needle or suturing material.

The writer believes that damage of the tissue produced by skin sutures applied under tension plays an important role in the genesis of local skin metastases. He discusses 2 cases under his own observation. In one case a benign fibroadenoma had been removed by another surgeon at the medial superior quadrant but a deep-seated carcinoma at the lateral aspect of the same breast had been overlooked at that time. The sutures had been applied under tension after extirpation of the fibroadenoma. When the author saw the patient 6 months after the operation the scars of the skin sutures were hard like keloids and turned out to be carcinoma metastases. In this case the possibility of implantation could be ruled out because of the great distance between the fibroadenoma and the location of the carcinoma.

In the other case the patient had been treated by a charlatan for a tumor of the breast with subcutaneous injections around the mamma. When the author saw the patient 2 months later carcinoma metastases were found at two of the sites where the injections had been given, at a considerable distance from the primary carcinoma.

A number of other cases are quoted from the literature in which metastases of carcinoma developed in areas of the skin which had been exposed either to mechanical or to physical irritation. Of special interest are the cases in which skin metastases developed after x-ray therapy of gastric carcinoma. In these cases the skin metastases developed only in the fields which had been exposed to the x-rays.

Several hypotheses are discussed to explain the mechanism of so-called implantation metastases. There is sufficient evidence to assume that not all carcinoma cells which spread in tissues surrounding the primary tumor must necessarily lead to metastases. Probably most of these cells are destroyed by defense mechanisms of the normal tissue. When, however, tissue is damaged either mechanically, chemically, or physically (x-rays) a locus minoris resistentiae is created, and the lowered local resistance against tumor invasion may lead to metastases or local recurrences.

The practical consequence to be drawn from these observations is to avoid all tension in suturing the skin after extirpation of a carcinoma. If the skin cannot be sutured without the slightest tension it is better to leave a defect and to close it at a later date with use of a skin graft.

—*Werner M. Solmitz, M.D.*

TRACHEA, LUNGS, AND PLEURA

Traumatic Rupture of the Trachea (Rupture traumatique de la trachée.) RUBEN LAURIER, C. A. MESSIER, and JEAN-PAUL VENNE. *Union méd. Canada*, 1955, 84: 278.

THE AUTHORS report on a case of traumatic rupture of the inferior portion of the trachea. Six hours after a crushing injury of the thorax, shock, severe cough with expectoration of blood, and subcutaneous emphysema of the thorax and neck developed. No pneumothorax or rib fractures were found in the roentgenogram. During the next few hours the subcutaneous emphysema progressed rapidly, involving the face, shoulders, arms, and the abdomen.

Bronchoscopy revealed a tear 3 cm. in length in the anterolateral aspect of the inferior portion of the trachea. Thoracotomy was done in the right fourth intercostal space, and the posterior portion of the fifth rib was resected. The mediastinum was opened for a length of 10 cm. and the tear was sutured and covered with a graft of pleural tissue. The patient made an uneventful recovery.

This case is of interest because of the very rare occurrence of traumatic rupture of the thoracic portion of the trachea. —*Werner M. Solmitz, M.D.*

Surgery of the Bronchi and Trachea; Experience with the Pedicled Pericardial Fat Graft Reinforcement. LYMAN A. BREWER and ANGEL F. BAI. *Am. J. Surg.*, 1955, 89: 331.

DURING the past 5 years the authors have employed a viable pedicled pericardial fat graft in 293 cases of bronchial division and closure, and in 21 cases of plastic or resection operations on the trachea or bronchi.

The presence of adipose tissue lying over the pericardium has received little attention in the anatomy books, for this tissue seemed to have no special function or surgical use. This layer of fat, covered by mediastinal pleura, is most prominent over the apex of the heart, and can be dissected free from the heart without damaging its blood supply. In closing the bronchus after a pulmonary resection, the authors recommend fashioning an oval-shaped flap of the pliable posterior membranous portion of the bronchus and drawing this up to meet the rigid cartilaginous wall. This insures a closure without tension on the suture line. No clamps are placed on the bronchial wall where the sutures are to be taken. Tantalum wire is used as a suture material and then the mobilized fat graft is placed about the bronchial stump to insure protection to the suture lines.

In the reported series, there was no instance of bronchopleural fistula up to 3 weeks; this complication is a much dreaded event in this period of time. After the third week, however, 2 per cent of the patients developed bronchopleural fistulas which did not threaten life.

The authors also use the "thoracic omentum" graft to reinforce bronchotomy incisions as they believe that certain complications can be prevented by this measure. They also stress the importance of not having to preserve the surrounding pleura for bronchial reinforcement when this may at times mean re-

striction of the radical nature of the operation, and hence a compromise of the cure rate.

—*Matthew H. Evoy, M.D.*

Experiences with Extending the Indications for the Use of Tracheal and Bronchial Grafts. Osler A. Abbott, William E. VanFleet, and Albert E. Roberto. *J. Thorac. Surg.*, 1955, 29: 217.

The background investigations and clinical experiences relating to tracheobronchial reconstruction are outlined. The value of the contributions of Gebauer, to reconstruction of the tracheobronchial tree by grafting and other methods, is emphasized.

The indications for tracheal or bronchial reconstruction by grafting procedures are detailed and are grouped into three major categories. These consist of the management of acute trauma, of various types of bronchial stenosis, and of neoplastic lesions. Congenital defects may constitute a fourth indication for the use of grafts.

Experiences with the application of various types of grafting procedures in 10 nontuberculous lesions are outlined. Limited experience suggests that the grafts are well tolerated in childhood and appear to grow in a satisfactory manner with the child.

The use of grafts in the management of bronchogenic cyst of the tracheal wall and of a stricture secondary to prolonged endobronchial trauma by a foreign body has been carried out successfully. Experiences in 2 instances show that a more adequate operation for carcinoma arising in the hilar area of a lobe in patients with a severe associated restricted respiratory capacity can be performed. In 1 instance the graft has successfully tolerated intensive postoperative deep x-ray therapy.

An additional experience with management of an adenoma of the left main-stem bronchus and carina, with correction by local resection and grafting, has been presented. It is hoped that the use of bronchial grafts may extend the limits of operability of carcinoma arising in the right upper lobe area so a more adequate excision of the tracheal, carinal, and contralateral bronchial tissue may be performed. The limitations and problems inherent in the procedure have been presented.

A further important problem is the consideration of bringing an adequate blood supply to the base of large grafts. Graft survival requirements imply restrictions produced by dimensions and by the blood supply of the remaining strand of tracheobronchial tissue to which it is attached. It would seem reasonable to hope that a fairly vascular, pedicled type of pleural-fat graft, placed directly upon the base of the transplanted dermis, might decrease tendencies to local necrosis of the graft substance.

The problem of the need of postoperative tracheotomy is also an important question. Certainly there is some benefit in decreasing the pressure produced upon the suture line by cough with the glottis closed and intact cervical tracheal wall. The tracheotomy distinctly introduces a certain hazard of potential infection of the graft and restricts the normal humidification of the tracheobronchial airway. The opinion of the authors is that the need for tracheotomy is an individual factor to be determined by graft size, the presence or absence of a prosthesis, and the suppurative aspect of the patient's tracheobronchial tree.

Initial experiences with the employment of grafts in children suggest strongly that small or moderate-sized grafts will grow. One would fear the use of grafts larger than 3 by 1.5 cm. in the younger age group. Further observation and study, particularly experimental investigation, are needed to define the fate of grafts placed in infancy or childhood.

—*John H. Mohardt, M.D.*

The Functional Re-Education of Respiration in a Thoracic Surgery Center (La rieducazione funzionale dell'apparato respiratorio in un centro di toracochirurgia). Aldo De Maria. *Ann. ital chir.*, 1954, 31: 910.

The author points out that the postoperative course of patients undergoing pulmonary resections can be greatly improved by the careful preoperative evaluation of pulmonary function and by training the patient partially to control the expansion of various segments of the lung. For example, if it is thought that a patient will develop atelectasis or poor function of a certain lobe or segment, then he can be taught preferentially to expand that affected segment better. This is done by either teaching him to breathe with the diaphragm, or else by forcing expiration with the doctor's hand over the projected area on the chest wall of the lobe or segment thought to be poorly aerated.

This method of preoperative localized exercises has been used in England and in the author's opinion is as important as tracheobronchial aspiration. No objective proof that these exercises have a tendency to increase the respiratory exchange and function of the various segments is given.

—*Alexander J. Conte, M.D.*

Exchange of Gases in Acute Apnea (Der Gasstoffwechsel bei akutem Atemstillstand). H. Lechtenbörger, H. Valentin, H. Venrath, G. Fruhmann, and Others. *Thoraxchirurgie*, 1954, 2: 250.

Respiration by diffusion is defined as a spontaneous uptake of oxygen by the blood, occurring under certain conditions via the lungs without any respiratory movements or artificial respiration. The authors induced complete apnea with succinyl-Asta (R), a muscle relaxant, that immediately led to total paralysis of the peripheral breathing musculature. The apnea persisted for 2 to 8 minutes and the respiration returned spontaneously.

On the basis of studies conducted on 11 volunteers, the authors concluded that respiration by diffusion could take place in man, provided (1) a sufficiently high arterial oxygen saturation could be obtained and (2) during the period of apnea the organism be offered a sufficiently rich oxygen mixture. There was a direct relationship between the oxygen content of the gas mixture offered and the duration of oxygen saturation of the blood. Thus, in one experiment in which pure oxygen was administered in extreme hypopnea for over 6 minutes there was no drop in the arterial oxygen saturation. Air did not have sufficient oxygen saturation to provide for respiration by diffusion.

The time limit set for respiration by diffusion without causing damage to the organism was determined by the amount of carbon dioxide retained. Experimentally, it was found that under extreme hypopnea and respiration by oxygen diffusion the carbon dioxide content increased by 1.34 volume per cent per minute and that the *p*H of the blood was reduced by about 0.02 per minute. Should the fall continue in a straight line values such as are found clinically on the verge of coma would be reached within 15 to 25 minutes.

No direct relationship could be established between the carbon dioxide content of the blood and the pulse and blood pressure changes.

It is probable that in extreme hypopnea there was no actual respiration by diffusion but simply an afterflow of oxygen.

In the event of apnea or cardiac standstill it is important that the lung passages be free and that the heart resume its activity promptly in order to avoid anoxemic damage.

—*Sidney Smedresman, M.D.*

The Pathogenetic Concepts of Some Aspects of Pulmonary Disease. DAVID M. SPAIN. *Am. J. Surg.*, 1955, 89:118.

MODERN CONCEPTS of the pathogenesis of tuberculosis, suppurative inflammation of the lung, acute nonaeration of the lung, obstructive pneumonitis, fibrosis of the lung, and emphysema are discussed by the author.

Because of public health measures, current cases of adult tuberculosis are the result of primary infection occurring late in life. Bronchial involvement is common and is secondary to hilar and peribronchial lymph node tuberculosis with fistulas, focal scars, stenosis, diverticula, and bronchiectasis or obstructive emphysema. Isolated subapical necrotic foci remaining after intensive chemotherapy may persist without clinical signs. These lesions represent an incompletely healed cavity, or an area of caseous pneumonia or a tuberculoma which communicates with one or more bronchi. The latter are dangerous because they do not resorb, organize, or slough and they contain viable tubercle bacilli. The question of surgical excision of necrotic foci is not completely settled and hinges on the problem of simple excision of the necrotic focus or lobectomy.

Two important complications of suppurative inflammation of the lungs are bronchiectasis and lung abscess. Bronchiectasis follows after destruction of the bronchial musculoelastic layer with replacement by fibrous tissue and dilatation of the bronchus which may create an irreversible situation. Complications of bronchiectasis are pneumonitis, abscess, and hemorrhage.

Lung abscess may occur from aspiration of infected material, bronchial obstruction, liquefaction necrosis of a primary pneumonia, infected emboli, secondary infection of a pulmonary infarct, a congenital cyst, or emphysematous bullae. The aspiration lung abscess is located in the periphery of the lung and is segmental in distribution with the localization depending on the posture of the individual at the time of infection. The abscess at first is thin-walled with or without loculations or communications with the bronchial tree. Complications of lung abscess are bronchopleural fistula, empyema, spreading pneumonia, hemorrhage, and brain abscess.

The diagnosis of atelectasis is made when opacities are seen in roentgenograms taken in association with postanesthetic states, barbiturate narcosis, chest wall injuries, poliomyelitis, bronchial asthma, and aspiration of foreign material. It refers usually to collapse of varying portions of aerated lung tissue and is characterized by the absorption of alveolar air following bronchial obstruction. It is believed that the x-ray shadows are caused by congestion and edema. Massive collapse of the lung is due to a ball valve obstruction with egress of air during expiration and no ingress of air during inspiration, resulting in collapse of the lung and finally edema and inflammation. The development of edema is due to anoxia involving the alveolar capillaries and alteration of the capillary endothelium permitting fluid and cells to accumulate in the alveolar spaces. Without antibiotic therapy this is an ideal situation for the development of pneumonia. The term acute nonaeration of the lung is suggested for this condition.

Chronic obstructive pneumonitis is secondary to bronchial obstruction and is commonly due to carcinoma. During the early stages with incomplete obstruction, infection takes place and results in suppurative pneumonia, bronchiectasis, or lung abscess. Recurrences finally produce a fibrotic segment or lobe of lung even before the bronchus is completely obstructed. When areas of pneumonia fail to resolve, bronchial carcinoma, bronchial adenoma, foreign body, mucus inspissation, and broncholiths should be suspected.

The pattern and distribution of fibrosis of the lungs can be correlated with the severity of subjective pulmonary symptoms. The pattern of fibrosis may be bronchial, interstitial, parenchymal, vascular, or pleural. In the bronchial type, obstructive emphysema is a common end result. In diffuse interstitial fibrosis the diffusion of gases across the alveolar capillary membrane is disturbed. In the parenchymal or intra-alveolar lung fibrosis, functional impairment is related to the area of involvement and to the compensation of distention emphysema. Pleural fibrosis may be treated by decortication and in this manner the secondary effect of the pleural envelope on the lung may be obviated.

Of the three forms of emphysema, senile emphysema, distention compensatory emphysema, and obstructive large lung emphysema, the latter is the most important. The responsible mechanism for this condition is a chronic constrictive bronchiolitis or peribronchiolitis which narrows the lumen of the bronchioles and results in alveolar distention and finally in the formation of large bullae. These bullae may develop to such a degree as to either rupture or cause compression symptoms. Rupture of a bulla into the lung causes an interstitial emphysema as the gas dissects the tissue planes. As diffuse obstructive emphysema progresses marked ventilatory impairment, pulmonary hypertension, and cor pulmonale develop and affect the pulmonary reserve of the patient.

—*B. G. P. Shafiroff, M.D.*

The Asymptomatic Isolated Pulmonary Nodule. EARLE W. WILKINS, JR. *N. England J. M.*, 1955, 252: 515.

IN A SERIES of 77 incidental solitary pulmonary lesions seen at the Massachusetts General Hospital, Boston, from October 1, 1947 through October 1, 1954 there were 33 cases of carcinoma of which 27 were primary and 6 metastatic from other organs.

Other lesions were tuberculosis, 18 cases (23 per cent); hamartoma, 11 cases (14 per cent); and benign tumors, 10 cases (13 per cent). Of 10 benign tumors, 4 were pulmonary cysts, 3 mesotheliomas, 2 adenomas, and 1 tumor was a neurofibroma. There were 5 (7 per cent) inflammatory lesions including 2 granulomas, 1 paraffinoma, 1 hyperplastic lymph node, and 1 fibrin body.

Treatment for these patients consisted of pneumonectomy (5 patients), lobectomy (32 patients), segmental excision (8 cases), local excision (30 cases), exploration and biopsy (1 case), and drainage of malignant abscess (1 case).

Only 2 of 27 cases of primary lung carcinoma occurred before the age of 50 years. In patients over this age, 50 per cent of the asymptomatic circumscribed lesions removed surgically were primary carcinomas of the lung.

Bronchoscopy, performed in 33 cases, gave positive diagnostic assistance in only 3. Among 32 patients whose sputum was examined by the Papanicolaou method, there were only 3 reports of malignant cells. Negative findings at bronchoscopy and on Papanicolaou smear were regarded as a manifestation of the peripheral location of these tumors with remoteness from the larger bronchi.

Sixteen of 77 patients had previous roentgenograms of the lungs that were available for comparison. Seven had carcinoma; in 4 of these the previous examination had been negative. If, in patients over 50 years of age, a lesion appears in lung fields that have previously been clear roentgenologically, the diagnosis of carcinoma is almost certain.

In only 2 patients was laminography employed and in neither was it of any assistance in diagnosis. Calcification is usually not seen in carcinoma except for that accompanying tuberculosis. Aspiration biopsy was not employed. Intradermal sensitivity tests were of no assistance.

Exploration of the thorax for diagnosis carries a negligible morbidity and is advocated in these cases. The results of expectant management may be tragic.

—Frederick W. Preston, M.D.

A Clinical and Pathologic Study of Bronchial Adenomas (Zur Klinik und Pathologie der Bronchialadenome). H. KIRSCHNER and W. KNY. *Thoraxchirurgie*, 1955, 2: 362.

THE AUTHORS report in detail on 9 patients with bronchial adenoma (7 males and 2 females), ranging in age from 15 to 59 years. Their symptoms had lasted from 6 months to 15 years. All patients had a cough, and all but 1 had evidence of pulmonary infection at one time or another. Five had frank hemoptysis and there was blood in the sputum of 3 others. The admitting diagnosis in 6 patients was bronchogenic carcinoma. Five patients were subjected to bronchoscopy; the tumor was visualized in 3. The involved bronchus was closed off in 1 other, and excessive bleeding necessitated discontinuation of the procedure in the fifth. Bronchography was performed in 7 patients. A filling defect was apparent in the involved bronchus in 5, and a bronchial narrowing in 1 other. Bronchiectasis or bronchial dilatation distal to the lesion was seen in 3 patients.

All patients were treated surgically. The preoperative diagnosis in 4 was bronchial adenoma, and in 3, bronchogenic carcinoma. Three of the patients have died. A 44 year old male died in shock 12 hours after right pneumonectomy, a 51 year old male died of respiratory insufficiency and cachexia 1 month after right upper and middle lobectomy, and a 53 year old male died 1.5 years after operation, of generalized metastases.

The marked hyperemia of the bronchial mucosa found bronchoscopically in the vicinity of the adenoma, without inflammatory change, is emphasized as a differential feature; so is the smooth contour of the sharply circumscribed filling defect visualized bronchographically, especially if there is bronchiectatic dilatation distally. The good general physical condition of these patients, despite many months or years of symptoms, should cast doubt on the diagnosis of carcinoma or tuberculosis when the lesion is first found on roentgen examination.

The adenomas are divided into four groups histologically, and each group is described in detail. Four of the 9 tumors either had areas suggesting malignant change histologically, or behaved in malignant fashion. Three of these were of the mixed tumor or cylindromatous type. In 1, which had not apparently metastasized, the focal malignant change consisted of loss of glandular pattern, an increased number of mitoses, loss of intercellular mucus and hyaline substance, and necrosis. Three tumors had metastasized to the lymph nodes. In 1 of these, careful microscopic examination of the primary tumor failed to reveal areas of histologic alteration such as are found in the lymph node.

The authors conclude that the so-called bronchial adenoma must be regarded as potentially malignant, and that this malignancy may be manifested in two ways. Metastasis may occur following change in structure, or it may take place without such histologic alteration. Even in this latter group the pleomorphism and number of mitoses are greater than in the tumors which remain benign. *—Elmer V. Dahl, M.D.*

The Growth of Intrathoracic Strumas and Its Clinical Importance (Ueber das Wachstum intrathorakaler Strumen und seine klinische Bedeutung). ERICH WILHELM. *Thoraxchirurgie*, 1955, 2: 449.

THE AUTHOR, of the Surgical Department of the University of Hamburg, Germany, discusses 24 cases of intrathoracic struma observed during the last 3.5 years.

According to the literature and the writer's own observations the great majority of these strumas are located in the right thoracic cavity. Only in one of the 24 cases was the struma located on the left side. This case was a true isolated accessory thyroid without connection to the main thyroid gland.

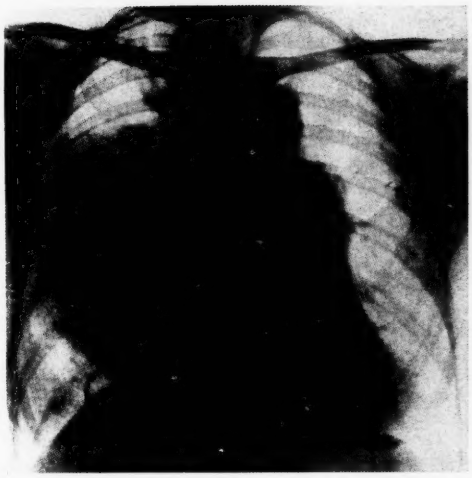

FIG. 1. (Wilhelm). Giant struma in woman, 56 years, located in the anterior mediastinum and spreading almost exclusively in the right thoracic cavity. The heart is displaced to the left. Extirpation was done by longitudinal division of the sternum. Two peglike excrescences at the level of the aortic and pulmonary arches penetrated into the left thoracic cavity.

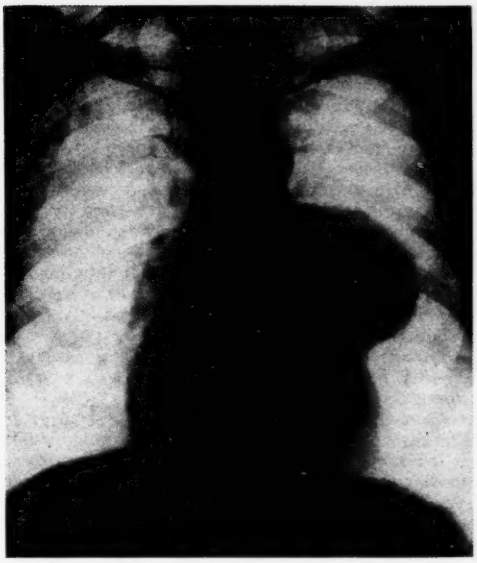

FIG. 2. True accessory struma, completely isolated in the left anterior mediastinum in a man 60 years old.

The author emphasizes that a large proportion of strumas filling the right mediastinal space did not originate from the right but from the left thyroid lobe. The cause for this apparently paradoxic growth was seen in the anatomical conditions. The aortic arch, the left subclavian, and the left common carotid arteries form a fanlike screen which protects the left upper mediastinum and deviates the intrathoracic growth of a struma toward the right.

Intrathoracic goiters originating from the left thyroid lobe compress and displace the trachea and the esophagus. It has been found that this is not the case in intrathoracic strumas originating from the right lobe.

A special type is the so-called intervisceral struma in which the goiter grows to the right between the trachea and the esophagus which are pushed apart by the expanding tumor (FIG. 3). These intervisceral forms originate practically always from the left lobe. The recurrent nerve is often displaced with paresthesia by an intrathoracic struma, the left much more frequently than the right.

Whereas intrathoracic strumas in the posterior mediastinum nearly always expand to the right, this is not always so in tumors growing in the anterior mediastinum. The "arterial fan" mentioned coursed from the left dorsally to the right ventrally and made an expansion of the tumor to the left side possible. In addition, the left innominate vein may constitute an obstacle for the growth to the right.

In extirpation of intrathoracic strumas it is important to remember that a tumor in the right intrathoracic space may have originated from the left thyroid lobe. If cervical extraction is not practicable then, after right thoracotomy, the *left* (not the right) inferior thyroid artery must be ligated.

In the author's 24 cases 16 of the strumas were located in the anterior mediastinum. Of these, 14 were extirpated by the cervical route, and 2 by the transthoracic. Of the 8 strumas in the posterior mediastinum 4 were removed cervically and 4 by thoracotomy.

—*Werner M. Solmitz, M.D.*

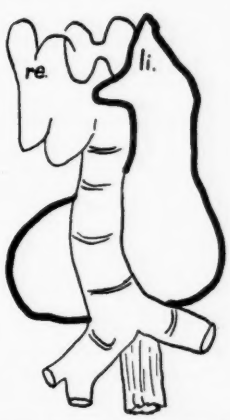

FIG. 3. Diagram of an intrathoracic goiter originating from the left thyroid lobe and growing interviscerally between the trachea and the esophagus. The tumor, at first growing in the caudal direction, was deviated to the right by the arterial screen.

Primary Malignant Neoplasms of the Lung. S. W. Moore and Donald R. Cole. *Ann. Surg.*, 1955, 141: 457.

The authors review 658 cases of primary lung cancer seen on the pavilion service of the New York Hospital during the past twenty years. In this group of patients, 280 were tobacco smokers; 267 were males and 13 were females.

Other possible etiologic factors were investigated, viz., (1) radioactive inhalation, (2) occupation, (3) residence, (4) sex, (5) age, and (6) association with concomitant disease. The only factor to indicate possible etiologic correlation was sex, in that of these cases 89 per cent were males and 11 per cent were females.

The tumors were classified as follows: epidermoid carcinoma, 168 cases; anaplastic carcinoma (includes round cell and oat cell types), 147 cases; adenocarcinoma, 56 cases; adenoma, 9 cases; alveolar cell carcinoma, 3 cases; fibrosarcoma, 2 cases; and chondrosarcoma, 1 case.

Cough, the most common symptom, occurred in 264 cases (63 per cent). Chest pain was noted in 248 of the patients (62 per cent). In 159 patients this was interpreted as parenchymal pain due to intrabronchial neoplasm, and in the remaining 87 patients it was interpreted as the pain of pleuritis. Thirty-nine patients had hypertrophic osteoarthropathy. The superior vena caval syndrome secondary to superior vena cava obstruction was found in 9 patients (2 per cent). Hyperpnea was observed in only 2 patients, but it is likely that this symptom was not sought for in many of the patients. One hundred and eighty-one of the patients had metastasis at the time of diagnosis, operation, or autopsy.

Roentgenologic examination was positive in 374 of the 401 proved cases (94 per cent). Angiocardiography, used in 66 patients, was positive in 43 (65 per cent). Bronchoscopy was carried out in 231 patients and direct observation, biopsy, and bronchial washings were utilized. In 135 of the patients a positive diagnosis was made by this means. Pleural fluid was studied in 36 patients and a positive smear made in 18 (50 per cent). Direct biopsy at the time of thoracotomy was carried out in 70 patients with a positive diagnosis; in addition a distant metastatic lesion was biopsied in 53 cases with a positive result. The Papanicolaou study of sputum was made in 125 patients, with a positive diagnosis in 83 (65 per cent).

The incidence of patients with carcinoma of the lung has increased 462 per cent in the 20 year period studied, while the total number of admissions has increased only 87 per cent.

Because the adenoma is considered a premalignant lesion, the 9 patients with this diagnosis are presented in clinical summary. Three of the 9 patients have died of carcinoma, 3 were lost to follow-up, and 3 are alive.

Roentgen therapy was used in the far advanced lesions only, so that no evaluation of this method is available. Seventy-four patients underwent exploratory thoracotomy and biopsy only, with a mortality of 4 per cent. Lobectomy was performed in 12 patients without a mortality. Pneumonectomy was performed in 63 patients with a mortality of 17 per cent. When all tumor was removed the mortality changed very little after 2 years. At 2 years 45 per cent of the patients were alive and well, while at 5 years and 10 years 30 per cent were still alive.

—*John H, Davis, M.D.*

Cytologic Diagnosis of Bronchial Carcinoma (Die zytologische Diagnostik des Bronchialkarzinoms). L. B. van der Slikke. *Thoraxchirurgie*, 1955, 2: 442.

The results of cytologic diagnosis in suspected bronchial carcinoma differ considerably in the statistics published by different investigators. The positive diagnoses varied between 43 and 84 per cent and the false positives between 0.3 and 6 per cent. It can be assumed that this wide difference is mainly caused by different methods of collecting and processing the material.

The author, of the University of Groningen, Netherlands, discusses the technique of collecting and staining, and the results of cytologic examinations in a series of 574 patients among whom there were 140 cases of carcinoma.

The material was partly obtained by aspiration during bronchoscopy; in most of the cases, however, it came from the sputum collected in the morning. The advantages and disadvantages of both methods are discussed. When sputum was used three specimens were taken on consecutive days, and two slides were examined of every specimen. Altogether 2,732 slides were examined in these 574 cases.

In 70.7 per cent of the carcinomas the cytologic diagnosis was positive and confirmed by histologic examination. False negative results were obtained either by complicating infectious processes, or in compression of the bronchus by metastases in the hilar lymph nodes, or they occurred in cases of carcinoma solidum or oatcell carcinoma. It is easily understandable that in these types the tumor cells are less likely to be separated from the carcinoma and get into the sputum.

Only 2 cases of false positive cytologic diagnosis were recorded in this series. In these cases metaplasia was mistaken for carcinoma.

—*Werner M. Solmitz, M.D.*

Relative Frequency and Distribution of Histologic Types of Bronchogenic Carcinomas; a Study of 670 Cases (Fréquence relative et répartition des formes histologiques des carcinomes bronchiques; étude de 670 cas). Jacques Delarue and Jean Paillas. *J. fr. méd. chir. thorac.*, 1955, 9: 1.

In the last few years it has become possible to establish correlations between the macroscopic aspect, the histologic type, and the evolution of bronchogenic carcinomas. The authors made a statistical study of 670 cases of such tumors in regard to the relative frequency of various histologic types, and their distribution in relation to the age and sex of the patients and the location of the neoplasms.

Three histologic types may be distinguished: (1) differentiated or nondifferentiated epidermoid carcinomas, (2) anaplastic, macrocellular or microcellular cancers, and (3) glandular or cylindrical forms.

In the authors' series epidermoid carcinomas represented 70 per cent of the entire group, while according to the statistics of the Society of Geographic Pa-

thology they form 50 per cent of all bronchogenic carcinomas. Mature types were present in 43.8 per cent and immature types in 56.2 per cent of this group. Anaplastic tumors were found in 28 per cent and the cylindrical type, or adenocarcinoma, in 2 per cent of the entire series. Microcellular forms were recorded in 52 per cent and macrocellular forms in 48 per cent of the anaplastic group.

The group of anaplastic macrocellular cancers is heterogeneous because many authors place into it either histologic types which they cannot exactly classify, or nondifferentiated epidermoid carcinomas with signs of keratinization. Moreover, bronchopulmonary metastases of visceral carcinomas may be mistaken for primary anaplastic tumors.

A large number of tumors considered primary adenocarcinoma is in reality formed by metastases of a visceral or genital neoplasm which, being latent, may escape attention.

According to age, 48.7 per cent of the patients were in the sixth decade, 23.5 per cent in the fifth decade, and 19.3 per cent in the seventh decade of life. In the age group of 20 to 30 years microcellular anaplastic carcinomas were practically the only type found.

Nine per cent of all patients in the authors' series were women and 90 per cent were men. Ninety-seven per cent of epidermoid carcinomas were found in men. Among the patients with macrocellular anaplastic carcinoma 26 per cent were women, while in the group with the microcellular variety 6.3 per cent were females.

The right lung was affected in 47.8 per cent of the entire group, the left lung in 50 per cent, and the trachea and the intertracheobronchial region in 2.2 per cent. The main upper and the main lower bronchus were the most frequent sites of cancer.

—*Joseph K. Narat, M.D.*

Bronchial Carcinoma in Printers. Erik Ask-Upmark. *Dis. Chest*, 1955, 27: 427.

The author presents the interesting theory that typographers exposed to printing ink are especially liable to develop bronchogenic carcinoma. This paper, although statistical in form, is really philosophic, for the number of cases analyzed are too few to allow valid conclusions. The author further philosophizes about the similar rate of increase of bronchogenic carcinoma and the amount of printed material the public reads daily. He concludes that all printers should have periodic screening with chest roentgenograms.

—*John C. Carlisle, M.D.*

Surgical Treatment of Lung Cancer Found on X-Ray Survey. Richard H. Overholt, James A. Bougas, and Francis M. Woods. *N. England J. M.*, 1955, 252: 429.

Silent cancers of the lung discovered by mass x-ray examinations have a higher rate of resectability and a better curability potential than symptomatic cancers. A total of 46 patients with such cancers were treated between 1947 and 1953 and these constituted 4.2 per cent of a total of 1,100 with operative carcinomas of the lung. In 39 per cent there was delay of approximately 6 months after discovery of the chest lesion during which time pulmonary symptoms developed. In 80 per cent it was not possible to make a diagnosis until the chest was opened and in 77 per cent the pathologic lesion was resectable. In 57 per cent of the latter, there was no extension to the lymph nodes or demonstrable metastases. The 3 year survival rate in this group was 30 per cent as compared with 12 per cent in a group of symptomatic lung cancers.

Mass chest screening is urgently recommended, especially for males over the age of 40 years and should be included as part of the periodic health examination. Asymptomatic lung cancer may be misdiagnosed for tuberculoma, fibroid tuberculosis, pneumonia, or bronchiectasis. Every existent silent lung lesion should be regarded with suspicion. The coin-shaped lesion on x-ray examination is a common finding and cannot be disregarded because of lack of demonstrable change by periodic x-ray examinations over a period of months or years. When an exact diagnosis cannot be made, thoracotomy is indicated. A negative cytologic test of sputum and bronchial secretions does not exclude exploration of the chest. In every case the silent "coin" lesion should be removed whether granulomatous or malignant. Delays in operative intervention for sputum cultures or guinea-pig inoculations are contraindicated. Bronchoscopy is of little help in silent lesions but is of value prior to thoracotomy for inspection of the air passages. Tissue for histologic and frozen section diagnoses should be obtained from enlarged lymph nodes or directly by wedge resection or segmental resection of the suspicious tissue.

—*B. G. P. Shafiroff, M.D.*

Results of Surgical Treatment of Primary Carcinoma of the Lung. Joseph E. Macmanus, John R. Paine, Roland Anthone, and Arthur A. Anderson. *Surgery*, 1955, 37: 560.

The cases of 199 patients with cytologically proved cancer of the lung, who were subjected to thoracotomy between January, 1947 and December, 1953 are reviewed. Of these thoracotomies 103 were done at the Buffalo General Hospital and the remainder were done at the Roswell Park Institute for malignant disease. There was a remarkable similarity in the statistics from the two places. Adenomas, cylindromas, and metastatic carcinomas were excluded.

The preoperative diagnosis was frequently made on x-ray evidence and clinical symptoms alone. Approximately one-half of the patients had a preoperative positive cytologic diagnosis.

The resectability rate for the combined series was 53 per cent.

The over-all operative mortality for exploratory thoracotomy without resection was 2.2 per cent. For the operation of pneumonectomy, the combined operative mortality was 14 per cent. There were no operative deaths following lobectomies.

The 3 year survival rate for the patients leaving the hospital alive between 1947 and 1950 following extirpation of their carcinoma was 22 per cent.

In the past few years neither institution has noted any increase in the resectability rate. Delay in early diagnosis remains a grave obstacle to clinical progress.

Radical resection increases the morbidity of the operation, and at present it cannot be calculated whether it increases the survival times.

—*Frederick W. Preston, M.D.*

Bronchial Anastomosis and Bronchoplastic Procedures in the Interest of Preservation of Lung Tissue. DONALD L. PAULSON and ROBERT R. SHAW. *J. Thorac. Surg.*, 1955, 29: 238.

BRONCHIAL ANASTOMOSIS and bronchoplastic procedures in the interest of preservation of lung tissue are relatively new developments in the field of thoracic surgery. A traumatic, inflammatory, or neoplastic lesion of the bronchus does not always require resection of all of the lung tissue supplied by the involved bronchus. By means of various types of repair, it is possible to excise a portion of a bronchus and to restore continuity, thus salvaging a portion or all of the lung tissue distal to the point of exclusion.

The reports of Gebauer have demonstrated the value of the concept of pulmonary salvage through bronchial reparative procedures, particularly with reference to tuberculous bronchostenosis but including bronchial tumors. Others have recorded the successful application of various reconstructive procedures of the bronchus following the excision of tumors, traumatic strictures, and accidental bronchial division.

The authors have used a variety of procedures to restore bronchial continuity and preserve good lung tissue in 16 patients. The bronchial lesions so treated include traumatic occlusion, acute traumatic rupture, tuberculous stenosis, adenoma, and carcinoma. The management of the individual lesions is described in detail.

The authors are of the opinion and strongly emphasize the usefulness of bronchial suture, bronchial anastomosis, and bronchoplastic procedures for traumatic bronchial rupture, tuberculous bronchostenosis, and bronchial adenoma. These procedures should be considered in the surgical attack on any benign bronchial lesion to avoid unnecessary sacrifice of good lung tissue.

The utilization of these measures in the surgical attack on bronchogenic carcinoma must be carefully considered. Inadequate pulmonary reserve and the extension of operability justify their use in certain instances. The authors are of the opinion that in the interest of preservation of lung tissue and a lower mortality the operation of lobectomy with wide resection of the carcinoma, detailed dissection of the mediastinum, and bronchial anastomosis may be done deliberately in the cases in which it is believed to be an adequate operation for the tumor.

In the authors' experience in the treatment of bronchogenic carcinoma, lobectomy, when feasible, yields at least as good results as pneumonectomy, with a lower mortality. The mortality rate for 239 resections done for bronchogenic carcinoma during the period from 1945 to 1954 was 10.6 per cent for pneumonectomy and 3.1 per cent for lobectomy. The survival rates for 4 years or more for resections done for bronchogenic carcinoma in the years 1945 through 1950 are 25 per cent for lobectomy compared with 13 per cent for pneumonectomy.

In many instances more favorable lesions, such as well localized peripheral carcinoma, were removed by lobectomy; although this was not entirely true as the indications in some cases were chest wall involvement and poor pulmonary or cardiac reserve.

Pneumonectomy is the ideal cancer operation in the majority of bronchogenic carcinomas. There remains a group of localized lesions, however, for which lobectomy may be a desirable and practical operation combined with bronchial resection because of the low mortality rate and the advantages resulting from the preservation of lung tissue. In addition to the indications for lobectomy already given, this operation combined with bronchial resection and anastomosis may be considered for the well localized, small, centrally located lesions. Furthermore, this procedure will permit wider excision of the bronchus in the patients in whom limited cardiac or respiratory reserve makes lobectomy imperative.

Sixteen cases involving the use of bronchial anastomosis and bronchoplastic procedures in the interest of preservation of lung tissue are presented. Bronchial anastomoses have been utilized for bronchogenic carcinoma in 7 patients, because of inadequate pulmonary reserve deliberately for small, centrally located lesions, and to extend operability in 1 patient. Three patients died of their carcinoma within 1 year after operation. The remaining 4 patients, in 3 of whom the operation was done deliberately, are alive 1, 11, and 18 months, respectively. —*John H. Mohardt, M.D.*

Some Surgical Considerations in Pulmonary Decortication. PAUL C. SAMSON. *Am. J. Surg.*, 1955, 89: 364.

THE AUTHOR reviews the history of the operation called pulmonary decortication, which had its origin before the turn of the twentieth century. Great impetus was given to the operation during and after World War II, and perhaps the greatest experience with it has accumulated between 1940 and 1950.

The pathogenesis of hemo-organization is discussed, and emphasis is placed upon the fact that the pleura itself does not become thickened in this process. This observation has made possible the very successful surgical results following decortication even in the face of a severe amount of constricting material.

The author prefers removing a rib in the initial incision because he thinks that a more secure chest wall closure can be performed thereby. He does not invariably remove the parietal peel as he does not believe that it is necessary.

With long-standing tuberculous infection, the author reports on the surprising ease with which the peel and contained empyema can be removed completely without spilling of the contents. In these cases it is usually best to remove the parietal pleura along with the peel, a fact not generally appreciated.
—*Matthew H. Evoy, M.D.*

Is the Treatment of Pleural Empyema in Childhood Still a Problem? (Ist die Behandlung des Pleuraempyems im Kihdesalter heute noch ein Problem?) EDELTRUD HÖMMKEN. *Muench. med. Wschr.*, 1955, 97: 80.

IN THE PERIOD following the introduction of chemical and antibiotic therapy, from 1948 to 1952, there were many reports showing a decrease in the morbidity and mortality of empyema. By contrast, the author's series of 43 children admitted with pleural empyema in the period from March, 1953 to May, 1954 showed new problems. It appeared that vigorous antibiotic therapy of pneumonia and the local and

general therapy of the exudate were often insufficient and occasionally completely ineffective. The hemolytic staphylococcus caused 32 cases of empyema in this series and replaced the pneumococcus as the most common causative organism.

The anamnesis in most patients was short. There were 2 or 3 days of continuous grippe infection with cough, coryza, and sudden appearance of high temperature with considerable dyspnea and a tendency toward collapse. In spite of prompt antibiotic therapy, empyema could not be avoided. With few exceptions there were clinical and roentgenologic signs of pneumonia with abscess formation and perforation into the pleural cavity. There were 10 patients with spontaneous pneumothorax. In 4 patients there were subpleural abscesses and in 2 there was a communication with the bronchial system so that intrapleurally injected aureomycin was expectorated with the next cough. Empyema morbidity increased in the months of January and February as well as in September and October.

Since sulfonamides and penicillin were ineffective because of bacterial resistance, aureomycin, terramycin, and chloromycetin were used. To achieve a high antibiotic titer the drugs were also given intrapleurally. With long-continued administration of the antibiotics it appeared advisable to administer vitamins B and K to avoid complications. Streptomycin was used when indicated but not for longer than 10 days. Early and most extensive emptying of the pleural exudate by puncture was carried out, in contrast to previous years. This was necessary even in the very young because of heavy thickening of the exudate shortly after the beginning of therapy, and when tension pyopneumothorax became evident. No exudate could be obtained after 4 or 5 punctures. Adhesions and subsequent thorax deformities were rare. Seven children died, 5 within 24 hours of admission. —*Sidney Smedresman, M.D.*

HEART AND PERICARDIUM

Bullet Wound of the Left Ventricle. THOMAS W. INMON and B. E. POLLOCK. *Am. Heart J.*, 1955, 49: 459.

THIS REPORT deals with a myocardial lesion due to a bullet wound and a correlation of the electrocardiographic findings associated with this lesion. At operation the wound of entrance was located in the fourth left intercostal space, after which the bullet had traversed tangentially the outer wall of the left ventricle without injury to the descending branch of the left coronary artery and without entering into the cavity of the left ventricle. The wound proper, which was 4 cm. in diameter and involved most of the substance of the myocardium, was closed by a free pericardial graft sutured over it.

Serial electrocardiograms were taken during the postoperative course of this patient. The morning after operation, the electrocardiogram showed changes typical of myocardial infarction, particularly Lead aVL which indicated damage to the anterolateral aspect of the heart muscle. The latter observation coincided with experimental observations which proved that QS deflection was associated with injury or disease involving the outer 20 per cent of the myocardium. On the second postoperative day a pericardial friction rub was noted and the electrocardiogram indicated pericarditis. Later, electrocardiograms showed minor changes consistent with healing.

—*B. G. P. Shafiroff, M.D.*

Preoperative and Postoperative Oxygen Debt in Valvular Stenoses (Sauerstoffschuld bei Klappenstenosen vor und nach der Operation). GUSTAV NYLIN. *Muench. med. Wschr.*, 1954, 96: 1359.

ALTHOUGH they may have a normal heart musculature, cardiac volume, and no stasis, many patients with individual mitral, aortic, pulmonary stenoses or coarctation of the aorta are severely handicapped by dyspnea in their daily work. The most plausible explanation is that the purely mechanical obstruction of the stenotic valves prevents a sufficient increase in minute volume to satisfy the increased activity. This may be relieved by modern cardiac surgery. Determination of the relative oxygen debt, i.e., the per cent increase in oxygen consumption from the second up to and including the fifth minute immediately following cessation of a carefully standardized amount of activity as compared to values obtained at rest, allows greater precision in selecting cases for valvular operations. To illustrate:

In the first case, that of a woman of 50 years, the patient was admitted with dyspnea at rest and cyanotic lips. Auscultation and phonocardiography showed a typical mitral stenosis. There was no stasis and only a slight increase in venous pressure. The blood pressure was 120/95. The roentgenogram showed an almost normal cardiac volume, an increased pulmonary artery, and a slightly dilated left auricle. The electrocardiogram showed right axis deviation. Cardiac catheterization revealed pulmonary hypertension. The relative oxygen debt was 144 per cent (normal 40%). This was interpreted to mean that the patient carried on her work under almost anaerobic conditions and was not able to attain a moderate increase in minute volume on effort. In spite of her age valvulotomy was carried out successfully. The mitral stenosis was converted into an insufficiency. Pulmonary hypertension decreased considerably and the relative oxygen debt determination showed almost normal values. She was able to carry on her household activities and take long walks.

In the second case, that of a woman 26 years old, the patient appeared well but had a mitral facies. The heart volume was increased and the right ventricle was enlarged. The circulation time, relative oxygen debt, and pulmonary artery pressure were increased. Commissurotomy was carried out and re-examination 26 days later showed a 50 per cent decrease in the pulmonary artery pressure. The relative oxygen debt determination under light test conditions was 36 per cent (preoperatively it was found to be 122%).

Similarly, in one patient with pulmonary stenosis the preoperative and postoperative values were 143 and 84 per cent, respectively, while in another patient with coarctation of the aorta the corresponding values were 195 and 105 per cent (normal).

—*Sidney Smedresman, M.D.*

Revascularization of the Heart Muscle; Experimental and Histologic Results in Animals After Implantation of the Internal Mammary Artery (Zur Revascularisation des Herzmuskels; Tierexperimentelle und histologische Untersuchungsergebnisse nach Implantation der Arteria mammaria interna). I. OBIDITSCH-MAYER, M. WENZL, and G. WENSE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 143.

TRANSPLANTS of the internal mammary artery into the myocardium with a modified Vineberg technique, in which a lateral slit is made into the distal part of the transplant, were performed in dogs. The animals were sacrificed 2 days, 2 weeks, and 1 year, respectively, after the operation for histological study of the changes by which blood is allowed to flow from the internal mammary artery into the coronary system.

Two days postoperatively, the internal mammary artery was found to have a narrow, compressed lumen, carrying little blood. There was a small hematoma about the lateral opening. Leucocytic infiltration and venous congestion of the surrounding myocardium was noted.

Two weeks postoperatively, the lumen of the internal mammary artery was still quite narrow. A granulation tissue in which histiocytic elements were predominating had formed in the myocardium around the site of the lateral slit in the internal mammary artery and was continuous through the slit into the artery.

One year postoperatively, the internal mammary artery had become incorporated into the myocardium by means of a dense fibrous connective tissue. At the level of the lateral slit the artery was rotated in its long axis, with the proximal part of the slit directed toward the epicardium and the distal part toward the heart chamber. In the proximal end of the slit large capillaries were recognized, whereas at the distal end of the slit a different type of vessels was noted. They had thick walls in which many characteristic epithelioid cells were present. It could be demonstrated that the latter vessels were connected to the coronary artery system by means of curled branches of glomuslike appearance.

The authors, who did not ligate any branch of the coronary artery in these experiments, conclude that the unphysiologically high blood supply of the myocardium coming from the transplant is met with a twofold regulatory mechanism, as proved histologically:

1. A decrease of the over-all capillary diameter in the glomuslike vessels.

2. The local production of acetyl choline by the characteristic epithelioid cells in the walls of the new vessels (a well known function of these cells, according to the authors), causing vasospasm.

—*Fritz H. Moser, M.D.*

Clinicopathologic Study of Lung Biopsies Taken During Mitral Commissurotomy (Studio istologico delle biopsie polmonari e correlazioni anatomo-cliniche nei mitralici commissurotomizzati). G. FOJANINI, A. CONTI, and G. DI MATTEO. *Arch. ital. chir.*, 1955, 79: 89.

IT has been noted that after mitral commissurotomy the postoperative course varies with the patient. Excluding any factors that would have contraindicated surgery, many surgical failures may be attributed to vascular and parenchymatous changes in the lungs existing in a fair number of patients with mitral stenosis. Parker and Weiss in 1936 were the first to describe at autopsy the microscopic alterations of the vessels of the lungs in these patients, and since then others have described the lesions of so-called pulmonary atherosclerosis secondary to pulmonary hypertension which constitute a second barrier to the flow of blood through the lesser circulation.

For this study biopsies were taken from the lingula during mitral commissurotomy for mitral stenosis and stained with hematoxylin, eosin, and Weigert, Mallory, and Van Gieson stains. The following changes were noted. The arterioles showed muscular hypertrophy of the media. At times this was accompanied by elastic intimal thickening. There was no evidence of fibrous replacement of the media either in the small arteries or in the arterioles. This had been noted by other authors at the autopsy of patients who had died of mitral stenosis. A reduced vascular lumen was found as a consequence of these changes. No complete vascular obliteration was found. Parenchymatous changes consisted in a thickening of the alveolar septa because of an increase in collagen and cellular elements contained in the septa. This resulted in a decrease in the size of the alveoli. Rarely were any macrophages found in the alveoli.

These changes create in the lesser circulation a barrier proportional to the reduction of the vascular bed. One can assume that in the patients who present marked dyspnea and signs of an overworked right heart the barrier in the lesser circulation is at least as important as that at the level of the mitral valve. On the other hand, in patients with manifestations of pulmonary edema changes in the pulmonary arterial bed are probably less marked.

The increase in pulmonary artery resistance is due to the combination of organic changes already described and to arterial vasoconstriction protecting the capillary bed from sudden pressure changes. The latter recede after removal of the valvular obstacle. The organic changes, on the other hand, may or may not recede, which explains the differences in response to surgery. It is probable that the lesion most likely to recede is the muscular hypertrophy of the media of the small arteries and arterioles, while the elastic intimal thickening and the eventual fibrous replacement of the media are irreversible. —*René B. Menguy, M.D.*

Results of Radical Pericardiectomy for Constrictive Pericarditis; Chairman's Address. EMILE HOLMAN and FORREST WILLETT. *J. Am. M. Ass.*, 1955, 157: 789.

PERICARDIECTOMY for constrictive pericarditis involves excision of the pericardium beyond the left, right, and inferior cardiac borders with liberation of the inferior and superior vena cava. This radical operation was performed on 26 patients with 4 postoperative deaths and 1 death after simple exploration. Associate cardiac pathology such as pulmonic or mitral stenosis limited the degree of functional recovery in 3 patients. Excellent results were obtained in 14 patients with nontuberculous pericarditis, resulting in correction of the high venous pressure,

ascites, and peripheral edema. Good recovery was noted in 8 patients with tuberculous pericarditis except for limitations imposed by other complications of the tuberculosis. Although age is no contraindication to pericardiectomy, the operation should be performed as soon as possible after the diagnosis is established and a calcified pericardium is demonstrated.

Surgical approach to the heart is made by a midline sternal splitting incision by means of a circular electric saw. The incision over the pericardium is first made in the region of the apex of the heart where the muscle is thickest and the left cardiac border can be first freed. Care must be exercised in identifying the proper plane for separation from the heart muscle. When calcium penetrates the cardiac musculature this tissue should be left in situ in order to avoid hemorrhage. Maximal calcification was usually noted over the right half of the heart apparently because of displacement of the pathological pericardial fluid in that direction. Maximum thickness of the pericardium was found to occur at the junction between the diaphragm and the pericardium, extending from left to right. The paradoxical pulse of constrictive pericarditis, characterized by its disappearance during inspiration, was noted to be due to pull of the diaphragm and increased cardiac compression with limitations in the filling of the heart. Return of the venous pressure to normal and improvement of the arterial pressure occurred promptly after radical decortication. The sternum should be reapproximated securely with at least 3 wire sutures placed through the bone, not through the cartilage. The pectoral fascia and muscles should be restored to the midline and fixed with interrupted silk sutures. Drainage can be obtained best with a catheter leading from the mediastinum through the right pleural cavity and a second catheter for drainage from the hemithorax proper. —*B. G. P. Shafiroff, M.D.*

ESOPHAGUS AND MEDIASTINUM

Tracheobronchial Stenosis Following Nonpenetrating Chest Injuries (Aspects des lésions trachéo-bronchiques consécutives aux traumatismes du thorax). PIERRE-BOURGEOIS, J. LEMENAGER, and J. P. GARAIX. *Poumon*, 1955, 11: 93.

TOWARD THE END of the last century a number of fatalities occurring hours or days after a crushing chest injury were described; the significant lesion was a fracture of the cartilaginous tracheobronchial rings.

If death does not ensue, the patient may suffer tracheobronchial damage with only slight pain in the chest and transitory dyspnea; there may be subcutaneous emphysema or hemoptysis. Healing takes place in 8 to 10 days.

In the less fortunate, an obstruction of the tracheobronchial tree may develop several weeks to many years later. If the lesion is in the trachea, there is a sudden onset of dyspnea; if the site of injury is in the bronchus, the patient develops an atelectasis or bronchiectasis, but less dramatically.

The lesion consists of edema of the mucosa and fibrosis of the submucosa; it is usually asymmetrical and forms an incomplete diaphragm, leaving a lumen which may be only 3 to 4 mm. in diameter.

Treatment for tracheal obstructions is bronchoscopy, aspiration of mucus, and spraying of the edematous mucosa with adrenalin; a segmental resection of the area of stenosis is then done electively, but without much delay. With bronchial obstruction, the degree of bronchiectasis determines the treatment: if it is considered to be still reversible, the involved segment of the bronchus is resected; if not, a pneumonectomy is indicated.

The authors report a case of each kind of stenosis. Tracheal stenosis manifested itself in a 17 year old male with sudden severe dyspnea 10 to 15 days after a crushing chest injury; the patient succumbed after several attacks, all of which but the last were promptly relieved by a topical administration of adrenalin and aspiration of mucus. The second case was that of a 24 year old woman with bronchial obstruction and bronchiectasis developing 14 years after a fall.

—*Leonid S. Cherney, M.D.*

Unusual Manifestations of Carcinoma of the Esophagus. GEORGE T. WOHL, BERNARD H. PASTOR, and SAMUEL L. KARR. *N. England J. M.*, 1955, 252: 702.

THE AUTHORS emphasize the fact that 20 per cent of esophageal carcinomas are nonobstructing when first seen. In these cases dysphagia is absent, and the presenting symptoms are so varied that a high index of suspicion is necessary to establish the correct diagnosis. Seven cases are reported with the presenting complaints being hoarseness, cough, lung abscess, pneumonia, hematemesis, enlarged thyroid gland, and supraclavicular mass. In many instances the symptoms were due to distant metastases. The author points out that x-ray examination and esophagoscopy should be done in each suspected case.

—*John C. Carlisle, M.D.*

MISCELLANEOUS

Hiatus Hernia; a Review of Some Controversial Points. N. R. BARRETT. *Brit. J. Surg.*, 1954, 42: 231.

INASMUCH AS considerable confusion exists as to the varieties of hiatus hernia, 4 groups can be distinguished with advantage:

Congenital short esophagus. This condition cannot be diagnosed with certainty before the esophagus is examined at thoracotomy. Its presence may be suspected at endoscopy if the gastric epithelium reaches an unduly high point in the gullet, but the diagnosis of congenital short esophagus can be confirmed only by observing that, in spite of the gastric lining of the gullet, there is no peritoneal sac in the mediastinum and the anatomy of the left gastric artery is normal. The mediastinal part of the stomach is supplied by segmental branches from the aorta; that is, the gullet, lined by gastric epithelium, is not supplied by the left gastric artery except in the vicinity of the esophageal hiatus. The surgical import of these facts is that although the patient may have symptoms comparable to those produced by a sliding hiatal hernia, the operation which cures the latter cannot be done in some cases because the mediastinal part of the stomach cannot be elongated so that the cardia lies in the abdomen. In minor cases the diaphragm can be raised above the cardia if the surgeon believes this might cure the symptoms.

Paraesophageal hernia. The author suggests that this form of hernia is a true hernia in which parts of the abdominal viscera ascend into a preformed peritoneal sac lying in the mediastinum. The most likely explanation of the presence of the sac is persistence of the pneumatoenteric recess on the right side of the gullet. Hamilton, Boyd, and Mossman (1946) described this recess in these terms: "At about the 4 mm. stage, before the stomach has undergone rotation, small pocketlike excavations, right and left pneumatoenteric recesses, appear on each side of the dorsal mesogastrium. The left one is transitory and soon disappears, but the right one extends progressively into the mesentery not only transversely posterior to the stomach, but also cranially, on the right side of the esophagus and posterior to the right lobe of the developing liver, toward the right lung bud. Eventually this recess forms a large irregular space with a narrow opening into the peritoneal cavity. With the development of the dorsal portion of the diaphragm and the associated closure of the pleuroperitoneal canals the upper portion of the cranial extension of the pneumatoenteric recess becomes separated from the more caudal portion, the primitive lesser sac, and forms a small closed supradiaphragmatic mesothelial cavity, the infracardiac bursa."

The anatomic points about paraesophageal hernia are these. The esophagus is normal in length and anatomy. The cardia lies in its proper place and the left gastric artery tethers it effectively to the posterior abdominal wall. The lesser curve of the stomach is held between its two usual fixed points, namely, the cardia and the pylorus, and thus the greater curve of the stomach swings on the cardiopyloric axis to occupy the top of the hernial sac. The gastrocolic omentum travels into the sac with the stomach and lies in the front. It is rare for any viscus, apart from the stomach, to occupy the sac; but the colon may be drawn up as well, and Harrington has described one case in which he found only colon. The sac is always complete; the hernia is not "en glissade." The neck is most cases is large and adhesions are apt to form between the inside of the sac and the omentum it contains, and for this reason the contents cannot always be reduced by traction from below the diaphragm.

Sliding hiatal hernia. In the series of the author, this variety is about ten times more common than all the others put together. The hernia is small and "en glissade"; it is one in which the cardia and adjacent parts of the greater and lesser curvatures slide up into the mediastinum, carrying a small sac of peritoneum applied to the left side of the stomach. The right side of the hernia includes the bare area of the stomach and is devoid of peritoneum. The sac is always empty and its upper margin marks the junction of the squamous and columnar epithelium inside the lumen. The branches of the left gastric artery, which normally supply these parts, pass up into the mediastinum with the displaced stomach.

Mixed hiatal hernias occur in which the sliding and paraesophageal types are mixed. These are unusual and frequently cannot be diagnosed prior to operation. Repair is effected according to the extent of the disease present.

A brief discussion is included concerning hiatus hernia and "peptic ulcer".

—Alan L. Dorian, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

The Peritoneum; a Plea for a Change in Attitude Towards This Membrane. D. C. WILLIAMS. *Brit. J. Surg.*, 1955, 42: 401.

THE AUTHOR challenges the view that peritonization is important in preventing adhesions on raw surfaces. He believes that the omentum or other structures will not become adherent to an inflamed tissue unless it is itself involved in the inflammatory process. This explains why a raw area, as such, does not incite the formation of adhesions. He contends that the normal structure becomes adherent to the diseased one only if the normal structure becomes involved in the inflammatory reaction.

The author speculates that in a raw area the cellular damage is so slight and its products so diluted by peritoneal fluid that if the area is left exposed no harm results, while if the area is peritonized the irritants are kept localized, and therefore the advantage of the exclusion of the area by a thin membrane is more than offset by the increased concentration of these substances. This is exemplified by a blood clot. If it is retroperitoneal and therefore localized, adhesions occur, while if free in the peritoneal cavity, as after a ruptured ectopic pregnancy, adhesions do not occur.

Rough manipulation that may be necessary to peritonize an awkwardly placed area may do more harm than good, apart from the introduction of suture material, which is irritating to the tissues. Bowel obstruction may result from a knuckle of small bowel passing through a small defect in the suture line.

An area devoid of peritoneum represents a site of devitalized tissue. It is also the region most likely to be infected; thus there are reasons enough for the production of adhesions without implicating the raw area as such. The author contends that there is no definite evidence that the raw area in itself is the cause of adhesions. In his own practice, the author does not peritonize the gallbladder bed after cholecystectomy, nor does he do so after hysterectomy, nor after any type of partial colectomy. Normally he does peritonize after excision of the rectum, but occasionally he does not, and in these patients he has not noted any adverse results. In no case in which he has not peritonized has he noted any postoperative bowel obstruction as a result of the raw area. Whenever he has seen a band causing trouble, only rarely has it been at a site consistent with the denuded area view. Sections of these bands have usually shown evidence of a foreign body, or there has been a history of infection.

Experiments on the regeneration of areas denuded of peritoneum were carried out on rabbits. The process of repair takes place simultaneously and rapidly over the whole area, as the cells arise from subjacent tissues and arrive at their final position by migration and not by growth as a continuous sheet, as is the case with epithelial repair.

The formation of a peritoneal surface over a pseudoappendix stump formed by the ligation of a bowel perforation was studied in rabbits. The smallest stumps healed most rapidly. Larger stumps containing vegetable debris did not contract adhesions unless infection was present. Grossly the perforated and ligated areas were pale yellow, smooth, and glistening. Histologic examination showed cells scattered at random in the fibrinous layer and a single layer of mesothelial cells were becoming differentiated on the surface. These cells were larger than those found in the regeneration of a denuded area. They may have come mainly from the periphery, in which event they apparently migrated as they were discrete and had not grown as a single continuous sheet.

Further studies were carried out on ligated omentum with part of its peritoneal surface removed. There were no adhesions involving the ligated omentum and the surface was smooth and glistening. Histologically, the surface of a ligated stump showed no fibrin layer and no evidence of regeneration of peritoneum after a period of 7 days.

—Robert Paradny, M.D.

Mesenteric Cysts (Ueber Mesenterialcysten). HERBERT HERBIG. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 294.

MESENTERIC CYSTS are uncommon lesions. An estimated 650 to 700 have been described. The author briefly reviews 155 reports of mesenteric cysts in the literature in the past 15 years, and adds 6 cases in detail. Such cysts may be classified as follows:

A. True cysts: (1) dysplastic cysts; (a) lymphatic, (b) enteroid, (c) wolffian, (d) dermoid, and (e) teratoid; and (2) parasitic: (a) echinococcal, and (b) cysticercosis.

B. False cysts: (1) traumatic, (2) hemorrhagic, (3) inflammatory, (4) degenerative, and (5) neoplastic.

Mesenteric cysts are predominantly of lymphatic origin (81, or 52.4% of the 155 reviewed); of these, chylous cysts were the most frequent (33, or 21.4%). In size these cysts varied from that of a cherry pit to that of a man's head. Their reported weights ranged from 520 to 2,250 gm. Of the author's 6 cases, 4 were cystic lymphangiomas, 1 was an enterocystoma, and 1 a cavernous lymphohemangioma. The great majority of these cysts were in the mesentery proper, most frequently in the region of the ileum. Locations in the mesocolon (predominantly of the transverse colon), greater omentum, lesser omentum, gastrocolic ligament, and hepatoduodenal ligament were considerably less common in descending order of frequency.

Patients in the second decade of life presented the greatest number of these 155 cysts. Only 6 cysts were found in infants, and 22 in children aged 1 to 10 years. The symptoms depended on the location, size, and relationship to the various organs. In the author's 6 patients, the symptoms lasted from only 20 hours in one to 13 years in another. Pain, often in the region of the umbilicus, was most readily explained by tension of the root of the mesentery. Most of the patients suffered repeated episodes of intestinal dysfunction,

sometimes transient ileus from mesenteric torsion and less often from tension or compression. Acute intestinal obstruction was rare. One of the author's patients suffered chronic and acute hemorrhagic episodes for many years from erosion of a lymphohemangiomatous cyst in the mesentery of the small bowel.

The great variety of symptoms and findings make preoperative diagnosis difficult. As in the diagnosis of other uncommon conditions, it is necessary that their occurrence be kept in mind. Exclusion of the gastrointestinal and urinary systems on the roentgenogram as the site of a palpable tumor is mandatory. A certain arciform mobility of these tumors in the direction of the mesenteric axis is said to be typical. Mesenteric cysts should be thought of especially in cases of ileus and peritonitis in childhood, when no other cause is clearly demonstrable. Therapy is surgical. An adjacent segment of bowel must often be sacrificed because the cyst cannot be removed without damage to the mesenteric vessels. Marsupialization and enterocystic anastomosis have been reported but are rarely indicated. The prognosis is good, but is influenced by such complications as acute intestinal obstruction and intra-abdominal rupture. Malignant transformation of a mesenteric cyst, type not specified, has been reported only once. —*Elmer V. Dahl, M.D.*

Reinforcement of the Inguinal Ligament for Recurrent Inguinal Hernias (Rinforzo del ligamento de Falloppio in alcune recidive per ernia inguinale). RIVA DAVIDE. *Gior. ital. chir.*, 1955, 11: 35.

THE AUTHOR reports his experiences with 3 cases of recurrent inguinal hernia which were repaired by a fascia lata transplant.

In many cases of recurrent inguinal hernia, one may encounter fibromuscular tissue which is flaccid, redundant, and often reduced to the consistency of connective tissue. In such cases there usually is some increased flexibility of the inguinal ligament, it is a flaccid inguinal ligament in which the ordinary Bassini procedure would be ineffective.

Under these conditions, the author suggests a surgical procedure whereby in a separate incision, a 10 cm. strip of fascia lata extending to the anterior superior iliac spine is prepared, and this strip is then transported subcutaneously to the site of the herniorrhaphy. While still keeping its attachment to the iliac spine, this strip of fascia lata is then rolled in a spiral fashion, a suture is tied to its free end, and this strip of fascia is then used in the form of a continuous suture to unite the transversalis and conjoined tendon to the inguinal ligament. This continuous fascial suture is carried down to, and includes, the periosteum of the pubic tubercle. The remainder of the procedure is carried out in accordance with the usual Bassini repair.

The author thinks that the anchorage of the fascia lata at the normal insertion in the iliac crest allows greater tension and is more physiological; thus, it would not undergo degeneration as is often seen in a free fascia lata graft. The author used this procedure in 3 cases and after a year there has been no recurrence of the hernia, and examination of each patient reveals a persistent tight closure.

—*Roland A. Manfredi, M.D.*

GASTROINTESTINAL TRACT

The Surgical Treatment of Cardiospasm (La chirurgia del cardiospasmo). C. BANZI and R. DAMIANI. *Arch. ital. mal. app. diger.*, 1955, 21: 3.

THE AUTHORS review the literature and report on 10 cases of cardiospasm which they treated by surgical measures. Cardiomyotomy was performed on 4 patients with the Heller technique. Esophagogastrostomy was performed on 3 patients with the Heyrowsky technique on 2 and the Gröndhal technique on one. Their best results were obtained in the 3 cases in which a cardiectomy was performed.

The authors use the abdominal approach for cardiectomy, whereas, in all cases reported in the literature the transthoracic approach was used. A left paramedian incision is made and the esophagus is liberated so that it can be lowered into the abdomen for about 10 cm. The vagus nerves are isolated and preserved. The esophagus is transected above the constricted area and the stomach at its middle third. The resected area includes the fundus and a part of the greater curvature. A terminolateral anastomosis is made on the anterior surface of the stomach below the diaphragm with the esophagus in its normal position.

The ample gastric resection suppresses the gastric acid secretions, while the conservation of the vagus nerves prevents the pylorospasm of vagotomy which is considered to be a factor favoring regurgitation. An anastomosis on the anterior surface of the stomach establishes an esophagogastric angle which approximates normal anatomical conditions. The authors believe that this technique eliminates at least in part those conditions which cause a gastroesophageal reflux and in this way prevents peptic esophagitis.

—*Lucian J. Fronduti, M.D.*

Hypertrophic Pyloric Stenosis of the Newborn (La sténose hypertrophique du pylore chez le nourrisson). B. HUBLET. *Acta chir. belg.*, 1954, 53: 913.

GASTROENTEROSTOMY was practiced for the relief of pyloric stenosis until 1908 when Fredet introduced extramucosa pylorotomy, now better known as the Rammstedt operation.

The author reviews 75 cases of his own. Of the infants 78.6 per cent were males, only 60 per cent being first born; there was no apparent hereditary tendency.

The cause is unknown, but the congenital nature is unquestionable. The pyloric olive is present at birth. The pyloric lumen does not become larger, and vomiting sets in when the volume of the feedings begins to exceed the stomach's capacity of normal evacuation. Vomiting usually starts gradually, but 13 per cent of the infants vomited from the time of birth. Stools become fewer, the urine becomes scantier, and the weight curve descends.

On examination following a feeding, peristaltic waves can be seen running from left to right. With patience and luck, an olive can be felt, but it is not a prerequisite for the diagnosis. X-rays are useful mainly to show the degree of stenosis.

In the differential diagnosis one should consider pylorospasm, duodenal atresia, obstruction due to malrotation, intracranial birth injury, and faulty feedings. The presence of the olive, absence of bile in

the vomitus, nonvisualization of the duodenum with x-rays and a barium meal, the presence of air in the intestinal tract, a negative neurological examination, and lack of improvement with change of formula establish the diagnosis.

Occasionally, conservative therapy is successful. The author prefers surgical intervention because it is safe, uniformly satisfactory, and eliminates the period of anxious waiting. Failure to gain weight is an absolute indication for surgery.

Hydration should be corrected before surgery. The author uses local anesthesia, a vertical incision extending down from the xiphoid for less than 3 cm.; the incision in the pylorus is made in the avascular area. Postoperatively, small hourly feedings are begun 2 hours after the operation, and are increased to a normal quantity in 6 hours. Parenteral fluid supplementation is usually necessary during the first 2 days. Thirty per cent of the patients have some postoperative vomiting. —*Leonid S. Cherney, M.D.*

Study of Recent Experimental Findings Concerning the Vascular Pathogenesis of Peptic Ulcers (Recherches sur les résultats expérimentaux récents concernant la pathogénie vasculaire de l'ulcère). E. ARON and H. SABASSIER. *Arch. mal. app. digest.*, Par., 1955, 43: 1171.

SHAY'S ULCER provoked in rats by ligating the pylorus is of little value for the study of drugs used in the treatment of ulcers because the intensity of the reflex vascular process has no relation to the quality of the gastric juice. Shay's ulcer is localized in the rumen which is a keratinized portion of the stomach. Fasting facilitates the nonphysiologic contact of the mucosa with gastric juice. Reflex vascular disturbances created by ligation of the pylorus facilitate necrosis. The fact that numerous drugs, extracts, and hormones are able to prevent the formation of such ulcers demonstrates the absence of a specific effect.

It has been shown that nephrectomy prevents development of Shay's ulcers. This protective action is due to suppression of a vasotropic ulcerogenic substance which renders the vascular system of the stomach vulnerable to gastric secretion. Conversely, biopsies of kidneys in patients with peptic ulcers demonstrate the great frequency of chronic renal lesions. Thus renewed interest is being shown in Virchow's view that the kidneys play an important role in the genesis of gastroduodenal ulcers.

Experiments on 300 rats, performed by the authors, have shown that the formation of Shay's ulcers can be prevented by leaving the kidneys intact but by ligating the ureters. The resulting azotemia reduces oxygen consumption, produces hypothermia, and augments the resistance of the rat to the ulcerogenic process. Suppression of the excretory function of the kidneys has no specific character; other vascular phenomena, such as anaphylactic edema, are also inhibited. Shay's ulcer must be considered a local manifestation of a specific aggression and not a general disturbance.

Virchow maintained that arterial spasm leads to ischemia which facilitates autodigestion of the gastric mucosa, but it has been shown that chronic endarteritis found at the base of peptic ulcers is of secondary nature. Furthermore, the mechanism of periodicity of ulcers cannot be explained by the existence of vascular obliteration.

The rôle of abnormal renal secretion in the genesis of peptic ulcers is highly questionable. The authors do not believe that studies on Shay's ulcer will solve the mystery of the pathogenesis of peptic ulcers.

—*Joseph K. Narat, M.D.*

Recurrent or Persistent Peptic Ulceration Following Secondary Operations for Peptic Ulcer; an Analysis of 11 Cases. TILDEN C. EVERSON and MAX J. ALLEN. *Am. Surgeon*, 1955, 21: 130.

IN A GROUP of 90 patients with gastrojejunal ulceration treated at the University of Illinois Research and Educational Hospital and the Hines Veterans Administration Hospital during the period from 1946 to 1954 there were 11 patients who had persistent or recurrent ulceration following secondary operations. An analysis of these 11 patients is the subject of this report.

These case reports are submitted, analyzed, and described individually. In this series of 11 patients a total of 38 operations, presumably intended to control the ulcer diathesis, were done. The number of such operations per patient varied from a minimum of two to a maximum of five in 2 patients. In addition, 4 operations were done for closure of older perforations. Review of the case reports, however, indicates that in only 24 of the 38 operations was the procedure generally accepted to be effective in controlling the ulcer diathesis, i.e., either gastric resection or vagotomy.

Vagotomy was done 9 times in this series; however, postoperatively it was found to be complete by the insulin test in only 2 patients. These 2 patients had relief of their ulcer symptoms. Gastric resection was performed 15 times; in only 7 instances, however, was 75 per cent or more of the stomach resected. In 5 of these patients control of the ulcer diathesis was obtained; 1 patient died postoperatively and the other required a vagotomy before cessation of the ulcer symptoms was obtained.

Persistent or recurrent ulceration following secondary as well as primary operations for the ulcer diathesis was in most instances due to inadequacy of the extent of gastric resection or to incompleteness of the vagotomy. If ulceration occurs after adequate gastric resection (75%), complete vagotomy will control the ulcer symptoms in the great majority of instances. The few patients who develop recurrent or persistent ulcer symptoms following adequate gastric resection and vagotomy may require nearly total gastric resection or, perhaps instead, extensive medical therapy.

—*John H. Mohardt, M.D.*

Gastric Granuloblastoma: Eosinophile (Contributo casistico al cosiddetto "granuloblastoma dello stomaco"). GIUSEPPE VANGELISTA. *Arch. ital. mal. app. diger.*, 1955, 21: 33.

THE AUTHOR presents a case report of eosinophile granuloblastoma in a 43 year old farmer. He was suspected of having a gastric neoplasm. There was marked tenderness in the epigastric region but no palpable tumor mass. X-rays revealed a dilated stomach and an antral deformity. At operation a tumor mass about the size of a small nut was found

in the pyloric region near the lesser curvature. About one-third of the stomach was resected and a Finsterer anastomosis was accomplished. The pathological report was eosinophile granuloblastoma. A two year follow up revealed the patient to be in good health.

A review of the literature is presented. The author favors the allergic conception with regard to the cause of this condition in view of the marked number of eosinophils seen in the tumor mass and the frequent eosinophilia which is found in the reported cases. The white blood count in this case was 7,800 with 10 per cent eosinophils. —*Lucian J. Fronduti, M.D.*

The Diagnosis of Gastric Cancer by Means of Cytology (O diagnóstico do câncer gástrico pela citologia). Luiz da Costa Lima. *Rev. brasil. cirurg.*, 1954, 28: 383.

The author was working at Cornell University in New York City on the service of Papanicolaou and has now returned to Rio de Janeiro where he is employed in the general Polyclinic under the direction of Jorge de Moraes Grey. The examination of the procured material is, of course, according to that of Papanicolaou; however, for the procuring of the gastric cellular material the gastric brush, developed by Ayre at the Cancer Institute at Miami, Florida, is being used.

Since the author's return to Brazil, his experience has not as yet been sufficiently extensive to justify final conclusions, and he prefers to depend for his evaluation of the method on the implications contained in the words of the old master Papanicolaou himself, who asserts that "In America the method of gastric cytology is still not used as a routine procedure," and in the words of his present superior, Moraes Grey who asserts that "every man of more than 40 years of age with symptoms suggesting gastric ulcer should be suspected of harboring a gastric cancer until proved otherwise."

The author also agrees with the assertion of Ayre that with the aid of the stomach brush he has been able to establish a diagnosis of certainty in 97.3 per cent of suspected cases, while with roentgenologic means such certainty has been achieved in only 66 per cent.

A recent experience from the author's own practice is here reported. In this instance the roentgenologic examination disclosed a shadow defect of ample size. Roentgenologically there was reported "a neoplastic process involving the lesser curvature and the duodenal bulb." Cytologic examination evidenced only abundant detritus of ingested food, exuberant bacterial flora, flat epithelial cells of the upper digestive tract, and rare agglomerations of the normal columnar cells of the gastric mucosa. Some of the latter cells showed, it is true, degenerative changes and a discrete anisonucleosis (negative: class II of Papanicolaou). The operation disclosed, however, the presence of a gauze pad which had been forgotten in an operation that had been performed 8 months previously.

On the whole, the author believes that the method is very accurate, and with the aid of the gastric brush the technique has been so simplified that it becomes practicable for use in the physician's own private office. With the help of gastric cytology the diagnosis of gastric cancer promises to be made sufficiently early that surgery will cease to be such a precarious alternative. —*John W. Brennan, M.D.*

Experimental Observations on the Etiology of Gastric Carcinoma; a Theoretical Analysis of the Problem. A. C. Ivy. *Gastroenterology*, 1955, 28: 325.

To obtain an idea of the most reasonable approaches to the solution of the problem of gastric cancer, the hypotheses pertaining to the nature of the cause of the malignant change in cells is first reviewed. The embryonic cell rest hypothesis of Cohnheim does not seem sound on the basis of evidence available, especially as it pertains to gastric cancer. (If this hypothesis were true, nothing of a preventive nature could be done unless environmental irritants could be found which incite the cell rests to malignant activity.) Ribbert's hypothesis of sequestered cells has a bearing on the relation of chronic ulcer, chronic gastritis, heterotopia, and polyps to the genesis of gastric cancer, for in these conditions cells are sometimes sequestered during the repair of an inflammatory process. Although the hypothesis of a virus or filterable agent has several attractive features, it has not been studied in relation to gastric cancer. The idea that certain types of gastric malignancy contain a "contagious" carcinogen, a special carcinogenic enzyme, or an autocatalytic protein is subject to experimental testing.

There are several hypotheses pertaining to heredity. The idea of preformation, whereby the appearance of a tumor at a particular time is predetermined by the genes is attractive when small, rapidly metastasizing greater curvature carcinomas with no other apparent preceding lesion are observed. This view leads to the hopeless assumption that, except through eugenics, the prevention of gastric cancer is an insoluble problem. Although spontaneous cancer of some other tissues has occurred in mice on a genetic basis, so far no one has produced a hereditary gastric cancer in any animal. (Because of its high incidence in man, the existence of a gene-character relationship in gastric cancer would seem more likely for man than for laboratory animals.)

Assuming that all normal cells have a low mutation rate to cancer cells, it is possible that carcinogens only increase this rate. These views assume that cancer may occur without the influence of internal and external agents, but this does not mean that external and internal exciting agents do *not* have an influence on the incidence and time of occurrence. The hypothesis that a cancer cell represents a gene mutation has several objections. Among others, it would require almost as many types of mutations as there are tumors, and there is no evidence of rapid histological change in appearance or biochemical activity which rapid mutations would presume.

The malignant change might better be viewed as an abnormality of differentiation rather than as a mutation. The existence of a difference in the susceptibility of different species and different individuals of the same species to internal and external, normal and abnormal stimuli and poisons is well known. This is well exemplified in the field of experimental carcinogenesis. Sometimes the susceptibility

can be increased by selective breeding. The theory of the existence of a genic species and a genic individual, and, again, tissue susceptibility has to be accepted in any consideration of the cause of gastric cancer. The truth of this theory has been established for laboratory animals, and must be assumed for man.

Virchow and many others have taught that tumors result from chronic irritation acting over a period of months or years. This hypothesis of chronic irritation maintains that to undergo a malignant change is a potentiality of all cells, but the degree of this potentiality varies widely between different cells. This permanent malignant change is viewed as an exaggeration of a normal physiological reaction to excitation, a reaction of repair of an injury caused by an irritant which may be external or internal. Accordingly, the malignant cell represents an adaptation which has been acquired slowly in response to an adverse environment, and in escaping from this environment it also escapes from the local factors controlling the normal pattern of the tissues. The specific irritation hypothesis maintains that the irritant must be specific to evoke a malignant change; not specific in regard to its physical or chemical nature, but specific in the sense that when the cell reacts to it for an adequate time a malignant change in the cell is the result. (Nonspecific irritants cause injury, inflammation, and reactive hyperplasia, but tumors are seen in the absence of any evidence of these reactions.) From the evidence, it would appear that the genesis of a malignancy is chiefly a function or product of two variables, namely, the degree of susceptibility of the tissue and the degree of the specificity of the irritant.

The prevailing view that malignant change is due to a specific agent has an important bearing on the experimental and clinical approach to the problem of the genesis of gastric cancer. (Experimental tumors more readily lend themselves to a careful and intensive morphological study than tumors which develop spontaneously in inbred mice or in man.) Those who believe that malignant cells may arise in very susceptible subjects on the basis of nonspecific irritation have support from observations of malignant change in such lesions as chronic ulcerations or osteomyelitic sinuses. These and the existence of so-called "precancerous" histological findings in a tissue subjected to chronic inflammation or irritation over a period of months cause one to hesitate to accept the proposed view that a specific carcinogen is always involved. Experimental cocarcinogenesis wherein a nonspecific irritant will precipitate a malignant change in an area already rendered susceptible by a specific carcinogen makes it necessary to consider the possibility that gastritis or a chronic gastric ulcer may act as a cocarcinogen in gastric malignancy.

It is possible that external carcinogens (dietary factors, such as, hot foods, heated fats, hydrocarbons) may operate to cause gastric cancer. Although relatively little work has been done in this field, gastric cancer has been incited with x-rays and the implantation of hydrocarbon carcinogens into the gastric walls of animals. The possibility that there is an endogenous carcinogen (a steroid substance or cholic acid derivative) exists and a study of extracts of gastric cancers would appear to be indicated.

Since the occurrence of gastric carcinoma (and also gastric ulcer and gastritis) is rare in other animals, and assuming that this difference is not entirely due to hereditary susceptibility, differences in living habits must be involved. Some of the obvious differences are that animals do not cook, season, or color their food, nor do they take medicine, use alcohol or tobacco, live and work in smoke and fumes, nor do they worry about the future, present, and past. Man does all of these things over an average span of life which is longer.

Following this review of the theoretical considerations, the relation of gastric cancer to chronic gastritis and chronic gastric ulcer in man is considered from an environmental viewpoint. While some gastric polyps develop malignant changes, they do not occur with sufficient frequency to account for the incidence of cancer of the stomach. Congenital heterotopia is also too infrequent to be considered an important factor.

There is rather extensive literature on the relationship of chronic gastritis to gastric cancer. It is contradictory in nature and, as Guiss and Stewart have pointed out, a statistical correlation between these diseases could indicate that any of the following statements might be true or false: chronic gastritis (a) occurs in many persons of the cancer age; (b) is a nonspecific concomitant of various gastric lesions; (c) is the result of gastric cancer; (d) precedes gastric cancer; and (e) acts as a cocarcinogen. A major difficulty in interpreting the results of the observations on the relationship between chronic gastritis and gastric cancer is that relatively so little is known about the causes of chronic gastritis. The important point so far as this theoretical analysis is concerned is that there are more than enough persons in the cancer age group with chronic gastritis to account for the incidence of cancer as a cause of death in a population.

A number of striking correlations between the incidence of gastric ulcer and gastric cancer indicate that the two are related and that exogenous factors may be acting on a gastric ulcer to produce a gastric cancer or on the stomach to predispose it to ulcer or both diseases. The mortality from gastric cancer varies considerably between different countries and races, which may represent differences in hereditary susceptibility or differences in eating habits. The higher incidence of gastric cancer in the male than in the female clearly indicates that internal or external environmental factors are involved just as they are in gastric ulcer. There seems to be a real difference in incidence of gastric as well as other carcinomas between social classes, with a higher incidence in the lower income groups. In the case of gastric carcinomas, this may be related to differences in diet.

Data dealing with the location of chronic gastric ulcer and gastric cancer are quite variable; however, the bulk indicates that approximately 66 per cent of chronic gastric ulcers are located in the region of the lesser curvature and that 20 per cent are located in the pyloric canal or antrum. Roughly speaking, the converse of this is true for the location of gastric cancer. The location of three times more carcinomas in the prepyloric region than in the region of the

lesser curvature has been explained as being due to the greater mechanical and chemical irritation to which the area is exposed. Experimentally, when methylcholanthrene is placed in the antrum and fundus of rats, three times more carcinomas occur in the antrum. This may be due to an inheritable difference in the susceptibility of the cells to mechanical and chemical irritation.

It is impossible to state unequivocally what percentage of chronic ulcers become malignant. The fact that 13 per cent of gastric craters may be malignant does not constitute direct proof that gastric cancer arises from a chronic gastric ulcer. Until a cancer is produced experimentally in a chronic gastric ulcer, some skeptics will doubt that such ever occurs. The important question for purposes of this analysis, however, concerns the incidence of gastric ulcer. Is it adequate to account for the number of gastric cancers seen in a population? From the data available it is clear that there are more than enough gastric ulcers to account for all the gastric cancers, assuming that all gastric cancers came from gastric ulcers.

It is concluded that, in the presence of gastric mucosal cells genetically susceptible to the induction of a malignant change, either (a) nonspecific irritants induce a malignant change in the cells by acting on the cells in the margin of a gastric ulcer or by causing the changes seen in chronic gastritis, or (b) a specific gastric carcinogen acts on cells in the normal mucosa or in the margin of an ulcer to incite a malignant change. —*David T. Petty, M.D.*

Carcinoma of the Stomach. Alton Ochsner, John Blalock and Antonio Sucre. *Am. Surgeon*, 1955, 21: 1.

Carcinoma of the stomach is superseded only by cancer of the lung as the most common malignant neoplasm in men. Although every physician is indoctrinated to suspect a malignant gastric lesion in patients over 40 years of age, who develop otherwise unexplained gastric symptoms, the end results of treatment of gastric cancer are far from good. One reason is that the diagnosis is usually made late, when the lesion is far advanced. In the Ochsner Clinic series of 258 cases, the operability incidence was 80 per cent; however, a resection was possible in only 37 per cent and the 5 year survival rate was 7.2 per cent.

Another reason advanced by some is that incomplete operations had been done, and that this situation can be corrected only by performing total gastrectomy in all patients. The authors believe that total gastrectomy is indicated only in proximally located lesions or in patients with infiltrative carcinoma, and that in distally located lesions it offers no more than does a radical subtotal resection. Unfortunately, there is some confusion about what constitutes a radical subtotal resection; autopsies show that far too frequently not enough stomach has been removed. The authors describe radical subtotal gastrectomy as follows: removal of the first portion of the duodenum and all the lesser curvature up to the cardia; removal of all the greater curvature up to within 5 or 6 cm. of the cardia; removal of all the gastrohepaticomentum, the gastrocolic omentum, and the greater omentum; careful dissection and removal of the lymph nodes along the lesser curvature (especially those around the celiac axis and the left gastric vessels), the subpyloric nodes, the subhepatic nodes, the gastrolineal nodes, and the paraesophageal nodes.

In the Ochsner Clinic (New Orleans) series of 258 cases of primary gastric malignant lesions, 95 per cent were carcinoma. Sixty-eight per cent of the patients with carcinoma were men and 32 per cent women. In men, only 13.6 per cent of the gastric cancers occurred before 50 years of age and 68 per cent occurred between 50 and 70 years of age, whereas in women, 17 per cent occurred before 50 and 54 per cent between 50 and 70 years of age. Sixty-five per cent of the lesions were described by the pathologist as showing diffuse involvement, 22 per cent were ulcerative, and 11 per cent polypoid. In the 247 cases of carcinoma there was an average duration of symptoms of 8.7 months, and an average weight loss (a manifestation in 90 per cent of the cases) of 25.7 pounds. Other prominent symptoms elicited were epigastric pain, nausea, tenderness, anorexia, simple vomiting, palpable mass, retention vomiting, melena, and dysphagia. Persistent anorexia which does not respond to therapy is frequently the only manifestation. Roentgenograms were positive in 96.6 per cent of all cases; the authors believe, however, that when a gastric lesion is large enough to be diagnosed as gastric cancer there is considerable likelihood that it may be extensive and inoperable.

In the present series of 247 patients, 33 (13 per cent) were inoperable when first seen, leaving 214 considered operable. Sixteen of these (7 per cent) refused surgery. Of the 198 who were explored, 107 (54 per cent) were found to be nonresectable. Of the 91 patients resected, in 60 (66 per cent) the lesion was advanced and a palliative procedure was done, leaving only 31 (34 per cent) in whom presumably a curative procedure was done. Radical subtotal resection gave as good results as total gastrectomy. Best results were obtained from subtotal resection for lesions apparently confined to the stomach.

From their analysis the authors conclude that in order to increase the salvage rates in gastric cancer, it is imperative that therapy be instituted while the lesion is not diagnosable as cancer. By this they mean that all patients with chronic gastric ulcer, gastric polyps, and certain types of persistent gastritis should be subjected to gastric resection. Furthermore, occasionally it is necessary to resort to abdominal exploration in men past 40 years who develop persisting gastric symptoms, causing weight loss, which do not respond to therapy, even though there is no laboratory evidence of gastric cancer.

—*Edwin J. Pulaski, M.D.*

The Use of a Gastric Tube to Replace or By-Pass the Esophagus. Henry J. Heimlich and James M. Winfield. *Surgery*, 1955, 37: 549.

The authors have devised an operation for making a tube out of the greater curvature of the stomach. The tube receives its blood supply from the gastroepiploic artery. It is left attached to the fundic portion of the stomach so that it can be rotated into the chest and used to replace a resected or obstructed

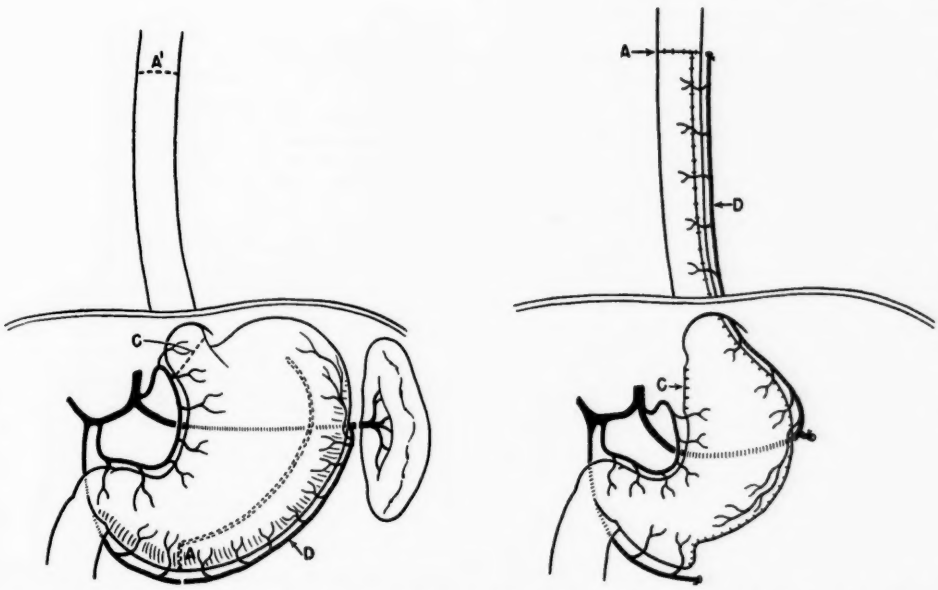

Fig. 1. (Heimlich, Winfield). Left, Broken lines indicate incisions. Sites of ligation of the splenic and gastroepiploic vessels are indicated by a break in their continuity. *A*, End of gastric tube which will be anastomosed to the proximal esophagus (A^1). *B*, Level of esophageal hiatus. *C*, Esophagocardiac junction. *D*, Gastroepiploic vessels. Right, Completed operation.

portion of the esophagus (Figs. 1 and 2). This type of esophageal replacement has the advantage that the stomach and intestines remain in their normal anatomic positions and the blood supply to these organs is not disturbed.

The operation was performed in 8 dogs through various types of thoracoabdominal or separate abdominal and thoracic approaches. The diaphragm was incised in some, although this was considered unnecessary as the tube can be brought through the esophageal hiatus. Splenectomy was done in most cases. Necrosis of the tube in one dog indicated the importance of preserving the gastroepiploic vessels. One dog in which the operation was successful remained in good nutritional condition until sacrificed 2 months postoperatively. The causes of death in other dogs included torsion of the tube, necrosis of the tube because of an inadequate blood supply, and death from unrelated causes. The procedure has not yet been applied to human beings.

—Frederick W. Preston, M.D.

Intestinal Obstruction in the Newborn. H. H. Nixon. *Arch. Dis. Childh.*, Lond., 1955, 30: 13.

Delay in the diagnosis of intestinal obstruction in the newborn infant is common. Factors responsible are the frequent passage of meconium below the obstruction, difficulty in assessing distention, the conception of vomiting as normal, and the apparent well-being of the baby. Plain roentgenograms of the abdomen which show fluid levels in progressively distending loops of bowel should clinch the diagnosis, and laparotomy should follow without delay.

The author discussed his experience during the past 5 years. Malrotation was treated by unrotating the gut; 12 of 15 patients survived. Only 5 out of 18 infants with duodenal atresia and stenosis survived. These patients have a high incidence of mongolism. Treatment usually consists of gastrojejunostomy or duodenojejunostomy.

Results of simple anastomosis for jejunoileal atresia and stenosis were poor. For this condition, the author recommends resection of the proximal hypertrophied segment of bowel prior to anastomosis, based on clinical and experimental observations. Of 33 patients admitted, 30 were operated upon; the survival rate after simple anastomosis was 33 per cent, and with resection and anastomosis, 67 per cent. It is suggested that an accident to the bowel after its formation is the most likely cause of this condition.

All patients with meconium ileus had fibrocystic disease of the pancreas and were treated by ileostomy, or resection with double-barreled ileostomy.

The management of Hirschsprung's disease is unsettled; possibly an ileostomy is done, followed by early reoperation with facilities for the examination of frozen sections.

Management in general should include gastric aspiration, prompt operation, transverse supraumbilical incision, conservative fluid therapy, and gradual institution of oral feeding.

—S. Lloyd Teitelman, M.D.

Congenital Intestinal Atresia. STEWART FEGGETTER. *Brit. J. Surg.*, 1955, 42: 378.

THE AUTHOR presents 35 cases of congenital intestinal atresia, in which operations were performed during the last 15 years.

Congenital atresia or stenosis of the intestine is of developmental origin. Before the fifth week of intrauterine life the intestine has an epithelial-lined lumen. During the sixth and seventh weeks the epithelium proliferates and the lumen becomes filled by this exuberant growth. Later vacuoles appear and coalesce to reconstitute the intestinal lumen. Any arrest of this process of vacuolization may result in defects of the bowel. There may be a complete interruption in continuity by fibrous tissue which may be septumlike, or which may be quite long, so that there are two blind ends, widely separated. In some cases the intestine may appear to be normal externally. If the septum only partially occludes the lumen, stenosis results. This process may occur in either the small or the large intestine. The commonest site for an atresia or stenosis is the duodenum. There may be multiple atresias. In the author's experience, atresia or stenosis occurs once in every 2,500 live births.

Persistent vomiting is the chief symptom. It starts shortly after birth and may be projectile. The vomitus usually contains bile since an atresia proximal to the ampulla of Vater is very rare. Constipation occurs, perhaps after the passage of some meconium. When the atresia is in the ileum there is usually complete constipation from birth. Dehydration rapidly becomes severe. Abdominal distention and visible peristalsis are usually present but may be absent. The symptoms and signs are somewhat more marked in atresia than in stenosis.

Differential diagnosis includes malrotation, strangulated hernia, intussusception, and Hirschsprung's disease. Congenital pyloric stenosis is rare before the age of 2 weeks and the vomitus is not bile-stained.

A flat radiograph of the abdomen confirms the diagnosis. Normally, gas shadows are seen in the intestines within a few hours of birth. In atresia of the duodenum the gas shadow is limited to the stomach and duodenum and there will be no gas in the lower abdomen. The writer usually supplemented the flat plate with a barium meal, using thin barium, to visualize the type and site of the atresia.

With early operation, the prognosis in duodenal atresia is quite good and 75 per cent of the infants can be saved. The prognosis for atresia of the ileum or colon is not so favorable.

Preoperative treatment includes the intravenous administration of fluid, electrolytes and blood, as well as intestinal intubation. The author finds open ether very suitable anesthesia.

In cases of duodenal atresia it is the practice of the author to perform either a posterior gastroenterostomy or a duodenojejunostomy, and he does an anastomosis even if there are no obvious signs of obstruction on inspection of the bowel.

In cases of atresia of the jejunum or ileum, there is usually an enormously distended proximal blind end which, because of the distention, is devitalized or even gangrenous, in which case a resection is required. The distal blind end is minute. Only a lateral anastomosis is possible. The lower collapsed bowel may be partially distended by passing a fine catheter down the intestine and injecting saline during the anastomosis. The proximal end may be decompressed by suction.

Atresia of the colon is rare. The author had one case, the atresia being deep in the pelvis. In this case he did a transverse colostomy, with dilatation, postoperatively, of the distal colon by repeated rectal flushes. Later, a lateral anastomosis was performed around the site of atresia.

Of the 35 cases, there were 16 survivals. In 7 cases (all fatal) the infants had multiple lesions, and excluding these the recovery rate was 58 per cent (16 of 28). Results were best in stenosis or atresia of the duodenum, with a recovery rate of 70 per cent.

—*Robert Paradny, M.D.*

Primary Malignant Tumors of the Jejunum and Ileum (Contribution à l'étude des tumeurs malignes primitives du jéjuno-iléon). F. CHANOINE. *Acta gastroenter. belg.*, 1955, 18: 163.

A STUDY is made of 786 cases or primary malignant tumors of the jejunum and ileum compiled from the literature.

Grossly, these lesions may be polypoid, sessile, or infiltrating. The last type have the greatest tendency to cause obstruction. Microscopically the lesions are divided into three groups: carcinomas, sarcomas, and carcinoids.

Carcinomas. Of the 786 cases, 256 or 32 per cent were carcinomas. Of these, 154 were adenocarcinomas, 85 were of the medullary type, 14 were schirrous, and 2 were of the colloid variety. A study of their localization showed that 85 per cent of the carcinomas were jejunal and 15 per cent were ileal. Also 35 per cent of the jejunal tumors lay between 0 and 5 cm. from the angle of Treitz, 62 per cent of the ileal tumors lay between 0 and 5 cm. from the ileocecal junction, 71 per cent of the carcinomas were causing obstruction.

Metastases from the 256 cases of carcinoma were divided in the following fashion: mesenteric nodes (120 cases), retroperitoneal nodes (8 cases), supraclavicular nodes (10 cases), liver (20 cases), peritoneum (13 cases), and colon and pancreas (6 cases).

Sarcomas (a) of lymphoid origin. Of 786 small bowel malignant tumors, 24.5 per cent were sarcomas of lymphoid origin. Of these 65 per cent were situated in the ileum usually in its distal third. Lymphosarcomas are often multiple (21%) and there was a tendency toward aneurysmal dilatation of the involved loop. Histologically, they were classified in the following fashion: stem cell sarcomas, reticulum cell sarcomas, and sarcomas deriving from lymphoblasts: lymphoblastic lymphosarcoma, lymphocytic lymphosarcoma, and giant follicle lymphosarcoma.

Eighty-four per cent of the tumors of lymphoid origin were lymphoblastic and lymphocytic lymphosarcomas. The 191 lymphosarcomas did not appear to be as malignant as is generally thought. Metastases were divided as follows: mesenteric lymph nodes (88 cases), peritoneum and retroperitoneal lymph nodes (17 cases), liver and gallbladder lymph nodes (15 cases), supraclavicular lymph nodes (7 cases), and lymph nodes of the lungs, bladder, and ovaries (5 cases).

Spindle cell sarcomas (*b*). Eighty-nine cases or 11.5 per cent were of this type. They are usually polypoid and grow away from the lumen of the bowel. According to their origin they are classified as leiomyosarcomas, fibrosarcomas, and malignant neurilemmomas. Leiomyosarcomas are more frequent. These tumors are not prone to metastasize and do so late. The metastases from 18 fibrosarcomas, 46 leiomyosarcomas, and 16 malignant neurilemmomas numbered 2, 13, and 2, respectively.

Carcinoids. One hundred and sixty cases or 20.2 per cent of 786 cases were carcinoids. They have a greater tendency to metastasize from other locations than from the appendix even though 70 per cent of them occur in this organ. Nineteen per cent had metastasized into the mesenteric lymph nodes. Other metastases were divided in the following manner: liver (17 cases), peritoneum (12 cases), and lungs (5 cases). Characteristically, the growth of metastases is slow.

Carcinoma of the small bowel is most frequent in the fifth, sixth, and seventh decades while lymphosarcoma is prevalent in the first five decades of life, the average age of patients with lymphosarcoma being 34 years. The age incidence of jejunoileal carcinoids is the same as that of carcinomas, differing somewhat in this respect from that of carcinoids of the appendix.

The most frequent manifestations of malignant tumors of the small bowel are: epigastric pain (82% of cases), loss of weight (81%), constipation (67%), alternating diarrhea and constipation (12%), and anemia (61%). Intestinal obstruction, either subacute (172 cases) or acute (71 cases), is a frequent complication. Perforation which is rare with carcinomas is more frequent with lymphosarcomas (18 cases). In 35 per cent of the small bowel sarcomas the tumor was palpable.

Roentgenologically, the presence of the tumor is indicated by signs of obstruction with proximal hyperstalsis and dilatation in the more advanced cases: (55% of the cases were seen at this stage). In 5.5 per cent of the cases the tumor was evidenced by a filling defect. The roentgenological signs of malignancy are: absence of mucosal folds, an eccentric lumen, a short tract, and rigidity of the affected segment. With leiomyomas there may be some disproportion between the size of the tumor which is palpable and that which is visible in the lumen of the gut because of the tendency these tumors have to grow away from the lumen.

The 5 year survivals for the patients treated surgically were: carcinomas, 8.2 per cent; carcinoids, 13.7 per cent; and spindle cell sarcomas, 16.3 per cent. For lymphosarcomas treated surgically the 5 year survival rate was 9.2 per cent and for those which had received x-ray therapy alone it was 6 per cent. For the patients with lymphosarcoma who were treated by both surgery and with x-rays the 5 year survival rate was 20 per cent.

—*René B. Menguy, M.D.*

Invagination of Meckel's Diverticulum (Invaginazione da diverticolo di Meckel). Ugo Gigli. *Ann. ital. chir.*, 1954, 31: 966.

A total of 160 cases of invagination of Meckel's diverticulum has been reported in the literature since this entity was first described in 1846. The author reports a total of 5 cases which he observed since 1938. About 1.5 to 3.5 per cent of cases of intestinal invagination are due to Meckel's diverticulum. Approximately 38.5 per cent of the cases of Meckel's diverticulum produce obstruction due to invagination. Thus, it is generally agreed the presence of Meckel's diverticulum definitely increases the incidence of intussusception.

There are two ways in which Meckel's diverticulum may initiate invagination. In one case the intussusception is due to an invagination of the apex of Meckel's diverticulum which continues into the lumen of the gastrointestinal tract and continues as the head of the invaginating segment. In the other method the base of Meckel's diverticulum acts as a focus with an invagination of bowel at this level which carries with it Meckel's diverticulum. In 4 of the 5 cases observed, invagination at the apex was responsible for intussusception. The length, caliber, and histological changes of the apex are important factors which act mechanically to produce this syndrome.

At laparotomy free blood was found in the peritoneal cavity in 3 cases. The mesentery in the region of the diverticulum was found to be opaque and engorged with adhesions which made reduction of the invagination impossible.

This condition is usually seen in the first decade of life, and affects males more frequently than females.

In 2 of the cases reported, the patients described previous episodes of abdominal crises with spontaneous resolution. In the cases reported, the episodes began from 1 to 4 days before surgery. In the fifth case, gastrointestinal disturbances had begun 15 days before surgery. The most frequent symptom is that of abdominal pain which is intermittent, colicky, and located in the region of the umbilicus. Emesis, when it appears, is usually constant and is usually gastric initially, then becomes biliary and even fecaloid. There may be diarrhea with melena. There is usually a low grade fever. On an objective examination, meteorism and increased peristalsis leading to ileus, and secondary changes in dehydration may be present. Because of the usual high location, the rectal examination may be negative. Leucocytosis is present. When a mass is palpable, it is usually found in the right lower quadrant.

Although the surgical indications are definite in this syndrome, the author is of the opinion that a roentgenological study of the abdomen may be very helpful in establishing the diagnosis of obstruction due to Meckel's diverticulum.

When obstruction in the distal portion of the ileum has been found to be due to Meckel's diverticulum, an attempt at manual reduction of the segment should be made. If this can be easily accomplished, then the Meckel's diverticulum should be resected at its base. However, if this is not possible, segmental resection of the involved portion of the small bowel should be carried out, and followed by primary anastomosis.

While the usual prognosis is favorable, it is affected by the age of the patient and the duration of the symptoms. In the series of 5 cases, there was one death, that of a 14 month old child; manual reduction of

the invagination had been done and the diverticulum had been resected at the base.

—*Roland A. Manfredi, M.D.*

Complicated Cancer of the Colon (Cáncer complicado del colon; comentario a propósito de algunas formas observadas; su tratamiento y resultados obtenidos). CARLOS SYLVESTRE BEGNIS. *An. cirug.*, Rosario, 1954, 19: 14.

THE AUTHOR presents a series of 4 patients with complicated and advanced carcinoma of the colon which were treated surgically and are surviving over periods of from 27 months to 6 years and 2 months. The first patient had multiple carcinomas of the colon and was treated surgically; the second was assumed to be inoperable because of invasion of the abdominal wall; the third patient's condition was complicated by extension of a carcinoma of the transverse colon into the stomach which required colectomy and subtotal gastrectomy; the fourth patient was debilitated by a fungating extension in the abdominal wall.

In each of the four cases reported the preoperative problem of operability was discussed. The author believes that many complicated and advanced carcinomas of the colon considered inoperable can and must be surgically treated, and that for better results in cancer control the only possibility at present is to widen the surgical indication.

—*W. Foster Montgomery, M.D.*

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

The Surgical Significance of Primary Carcinoma of the Liver; an Analysis of 66 Cases and a Report of an Unusual Case of Primary Hepatic Carcinoma. ROBERT C. OVERTON, VAN G. KADEN, and W. R. LIVESAY. *Surgery*, 1955, 37: 519.

SIXTY-SIX CASES of primary carcinoma of the liver observed during a 7 year period at four hospitals in Houston, Texas, are reported. The autopsy incidence of the disease at these hospitals was 0.88 per cent, which is higher than the incidence of carcinoma of the gallbladder and pancreas observed at these hospitals, and is higher than the average incidence of 0.25 per cent reported from other hospitals in the United States for carcinoma primary in the liver.

Physical findings of diagnostic significance in addition to an enlarged liver, include a friction rub over the liver, bloody ascites, and severe cachexia in a patient with no other etiologic factors demonstrable.

The diagnosis was made clinically without benefit of biopsy in 20.5 per cent of the 66 patients. In addition, hepatoma was strongly suspected in the differential diagnosis in another 20 per cent. The most frequent error in diagnosis was made in favor of cirrhosis (19 per cent of 66 patients) or metastatic carcinoma of the liver (15.5 per cent). Inflammatory disease of the extraheptic biliary system was erroneously suspected in 13.5 per cent of the patients, and amebic hepatitis in another 13 per cent. Poor or absent function of the gallbladder was demonstrated by cholecystography in a high percentage of patients, and chronic cholecystitis with cholelithiasis was detected at postmortem examination in 10 per cent of the group. The malignant liver is characteristically large, palpable, and tender, and is usually much firmer than one would expect in hepatomegaly of cardiac origin. Roentgenographically, a large hepar with encroachment upon the adjacent viscera and elevation of the right leaf of the diaphragm are the most constant positive findings.

Needle biopsy is not indicated except in patients whose condition has become deteriorated. Although it is helpful in these patients, the number of positive diagnoses gained does not overshadow its potential hazard. If the physical condition at all warrants it, exploration should be performed in all patients in whom hepatoma is suspected, both to establish the diagnosis and to evaluate the possibility of surgical extirpation. This may be accomplished under local anesthesia through a small right upper transverse incision and is probably no more hazardous than needling the liver.

Two patients in the series had surgical removal of the tumor, and extirpation would have been feasible in another 7 on the basis of the autopsy findings. Massive growth and hepatic replacement prior to the appearance of clinical manifestations preclude extirpation in most of these poor risk patients. One-half of the patients had distant metastases at autopsy, and one-sixth had venous invasion.

The average survival after the onset of symptoms was 5.7 months.

An unusual case of a malignant tumor of the liver occurring in an 8 month old boy is reported. Pathologic diagnosis was embryonal hepatoma (malignant teratoma) of the right lobe of the liver.

—*Frederick W. Preston, M.D.*

Tuberculosis of the Gallbladder (Ueber Tuberculose der Gallenblase). GÜNTHER WEITZ. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 318.

TWO CASES of tuberculosis of the gallbladder are reported. The author found in the literature 34 reports of tuberculosis of the same organ in which the diagnosis was confirmed through histological examination and 4 reports in which there were no histological examinations. In 27 of these cases gallstones were found.

For clinical reasons the author divides tuberculosis of the gallbladder into four groups: tuberculosis of the gallbladder associated with (1) miliary tuberculosis in children, (2) serious tuberculosis in other organs in adults, and (3) infection of the adjacent organs, and (4) clinically isolated tuberculosis of the gallbladder.

The 2 cases described belong to groups 2 and 4. In almost all of these two groups cholelithiasis was reported and was the indication for surgery. Tuberculosis was usually found on tissue section of the gallbladder. In groups 1 and 4, and frequently in group 2, infection occurred through the blood stream. In all cases cholecystectomy was indicated. The preoperative diagnosis in all reported cases was usually cholelithiasis with cholecystitis.

—*Frank R. Lichtenheld, M.D.*

Subtotal Cholecystectomy in Acute Cholecystitis. GORDON F. MADDING. *Am. J. Surg.*, 1955, 89: 604.

THE AUTHOR emphasizes the merits of a conservative operation in the presence of acute cholecystitis, i.e.

subtotal cholecystectomy, which is a modification of partial cholecystectomy. Subtotal cholecystectomy is to be considered only as a replacement for cholecystostomy, when this latter procedure is being considered, because of the technical hazards involved in carrying out a total cholecystectomy. The author describes an operation in which the gallbladder is subtotally removed leaving a small cuff of gallbladder only at the cystic duct. A Penrose drain is then placed into the stump of the gallbladder which remains. The author states that this usually should not exceed 1 cm. in diameter. The cuff is then closed about the drain with interrupted catgut sutures.

Total cholecystectomy, when feasible, is still the operation of choice in the surgical treatment of acute disease of the gallbladder, and subtotal cholecystectomy should not be considered to supplant it; however, when complete removal can not be safely accomplished the author recommends consideration of subtotal cholecystectomy. He presents 4 cases with no mortality, and with a morbidity comparable to that following total cholecystectomy in the treatment of the chronically infected gallbladder with cholelithiasis.

—*W. Foster Montgomery, M.D.*

Relation of Gallstone Disease to Angina Pectoris. I.S. RAVDIN, THOMAS FITZ-HUGH, JR., CHARLES C. WOLFERTH, EDWARD A. BARBIERI, and ROBERT G. RAVDIN. *Arch. Surg.*, 1955, 70: 333.

THE AUTHORS present a concise historical review of the relationship of gallstone disease and cardiac disturbances. They believe that gallbladder disease may mimic coronary or anginal symptomatology, and that reflex effects of biliary tract disease may precipitate or aggravate existing cardiac disease. A number of cases are reported, with preoperative and postoperative electrocardiograms illustrating the effects of gallbladder disease on angina, arrhythmia, and coronary infarction.

A preliminary review of 2,100 consecutive biliary tract operations, with special reference to co-existing cardiac disease, is also presented.

—*John C. Carlisle, M.D.*

Angioreticulosarcoma of the Gallbladder: Case Report (Contributo casistico ai tumori connettivali della cistifellea: su un raro caso di angioreticolosarcoma colecistico). GIUSEPPE VANGELISTA. *Arch. ital. mal. app. diger.*, 1954, 20: 464.

A 43 YEAR OLD FEMALE had been having biliary colic for about 1 year. A series of examinations of the gallbladder showed an enlarged organ with a large calculus.

At operation the gallbladder was found to be enlarged and adherent to the ileum and transverse colon. The common duct was normal. The gallbladder was freed from the adhesions with difficulty and then excised. The abdomen was closed and rubber tube drainage instituted.

The pathologic report was that of an angioreticulosarcoma, which was surprising to the author. A large stone was found in the fundus with a markedly thickened wall.

The patient was discharged after 30 days and was seen in 6 months and again after 1 year. She had gained weight and had suffered no biliary colic since the time of operation. —*Lucian J. Fronduti, M.D.*

Experimental Approach to the Repair of Benign Strictures of the Common Bile Duct (Ulteriori contributi sperimentali alla terapia chirurgica delle stenosi benigne del coledoco). DANTE MANFREDI. *Ann. ital. chir.*, 1954, 31: 845.

IN VIEWING the various methods used to reconstruct the common bile duct after repair or excision of a stricture, the author points out the great frequency with which precipitation of biliary salts occurs in vitallium tubes and stenosis in aortic or vena caval grafts to the common duct. Some have used vitallium tubes lined by fascia or skin, or skin grafts alone, but the latter have resulted in marked stenosis.

The author has devised a method of using a full thickness skin graft reinforced by a spiral of fine stainless steel wire placed intradermally around the tube, similar to the grafts used to replace defects of the trachea. In addition, a polyethylene tube splint was used inside the tube of skin, and this prosthesis was used in 16 dogs. These dogs were followed up and sacrificed from one to 9 months later. The polyethylene splint usually passed into the gastrointestinal tract in a few days and was eliminated.

All the animals when sacrificed had a patent graft with no evidence of stenosis or obstruction by bile salts. Histological sections showed that the graft had become replaced by fibrous tissue and that the epithelium of the common duct did not grow over the graft. Because of these promising results the authors recommend further trial of this method.

—*Alexander J. Conte, M.D.*

Extravasation of Bile After Operations on the Biliary Tract. GRAHAM MCKENZIE. *Austral. N. Zealand J. Surg.*, 1955, 24: 181.

THE AUTHOR presents a series of 20 cases of surgically treated patients whose postoperative courses were complicated by extravasation of bile. In 12 of the 20 patients studied, no source of extravasation could be identified. This identification of the source of the extravasation is extremely difficult at the operating table and oftentimes impossible in a postmortem examination.

Five sources of bile leakage are listed: (1) slipping of the ligature on the cystic duct; (2) operative damage to the hepatic or common bile ducts; (3) leakage from accessory ducts of the liver; (4) escape of bile after accidental dislodgment of a drainage tube in the common bile duct; and (5) seepage of bile through a suture line in the common bile duct.

In 12 of the 20 patients studied, no source of extravasation could be found either at a secondary operation or at the autopsy table. The diagnosis of postoperative extravasation of bile can be implemented by x-ray examination or paracentesis abdominis. Seven deaths occurred in the series of 20 cases.

The author divided the patients into two clinical groups, according to their course. In 7 patients, shock developed suddenly in the first 48 hours after operation; of these, 5 died. In the second group comprising 13 patients who ran a more benign course with an insidious onset, there were 2 deaths.

Delay in diagnosis is common, and once extravasation of bile is present its early evacuation with drainage of the abdomen should be undertaken at once. Treatment of this condition is discussed also from the point of view of prevention.

—*W. Foster Montgomery, M.D.*

The Annular Pancreas. BECK. *Acta chir. belg.*, 1955, 54: 72.

THE AUTHOR classifies duodenostenosis of the annular pancreas in five groups: (1) cases in which the mesenteric artery is the defining factor; (2) those in which the stenosis is caused by the middle colic artery; (3) those in which periviscerítis is the cause, with the narrowing mostly supramesocolic; (4) those with tumors at the base; and (5) the congenital malformations.

The history, incidence, and diagnosis are presented in addition to the roentgenologic aspects and treatment.

The author discusses the use of cortisone or ACTH in the treatment of patients with hypoglycemic convulsions. He considers gastroenterostomy, with resection of a part of the ring of the constriction, as the best surgical treatment.

—*W. Foster Montgomery, M.D.*

The Use of Human Serum Albumin in the Management of Acute Pancreatitis; Experimental and Clinical Observations. DANIEL W. ELLIOTT, ROBERT M. ZOLLINGER, RICHARD MOORE, and EDWIN H. ELLISON. *Gastroenterology*, 1955, 28: 563.

LARGE QUANTITIES of concentrated human serum albumin (300 to 500 c.c. per day) have been reported to ameliorate the course of acute pancreatitis. The specific agent responsible for favorable effects in the acute hemorrhagic phase was considered to be an antitryptic factor concentrated with the albumin. The authors record a series of observations on patients treated with albumin. They also present the results of their studies on experimental animals in which pancreatitis had been induced.

The role of trypsin in acute pancreatitis is somewhat obscure, but it has been found in ascitic fluid from patients with the disease along with amylase and lipase. Experimentally, trypsin injected into the pancreas will produce specific vascular lesions. There is indirect evidence that trypsin enters the blood stream during pancreatitis, and the toxicity of crude pancreatic trypsin when introduced into the blood stream has been observed in animals. The supposition has evolved that the toxicity of patients ill with pancreatitis is due to systemic liberation of trypsin. It has not been possible to measure trypsin in the blood stream because of the presence of antifibrinolysin, a potent enzymatic general inhibitor of proteolysis which is presumed to be concentrated with serum albumin and which is active in the inhibition of trypsin during acute pancreatitis.

Pancreatitis in dogs was treated with human serum albumin as well as with dextran, normal saline, and a very potent soy bean trypsin inhibitor, primarily for the sake of comparison. Normal serum amylase values in dogs (employing the Somogyi method) ranged from 200 to 1,000 units per cubic centimeter. All dogs had baseline determinations of hematocrit, amylase, fibrinogen, antifibrinolysin titer and prothrombin time preoperatively. Pancreatitis was induced by the retrograde injection of the dog's own bile into the accessory pancreatic duct. Control dogs had laparotomy and cannulization of the pancreatic duct without retrograde injection of bile.

Postoperatively, blood determinations and blood volume studies were made and then treatment by one of the various agents was instituted. The dogs surviving the induction of pancreatitis were subjected to laparotomy 10 to 20 days later and the pancreas biopsied. In the initial phase of the experiment, blood pressure dropped immediately after injection of bile; in dogs receiving effective treatment, pressures returned to within 10 to 15 mm. of prepancreatitis levels and remained there if treatment was effective. Whether or not pancreatitis was induced, there were marked changes in blood volume manifested by decreased plasma volume, increase in hematocrit, and a consequent sharp rise in red cell mass.

In 6 untreated dogs with pancreatitis, antifibrinolysin titers fell 30 per cent and fibrinogen levels fell 25 per cent; all these dogs died. Four dogs treated with saline shared a fate similar to those which were untreated. Three dogs treated with the trypsin inhibitor exhibited restoration of decreased antifibrinolysin titers; on the other hand, there was a marked plasma volume deficit and these dogs died. Six dogs were treated with dextran and 4 survived a satisfactory attack of pancreatitis with full restoration of the plasma volume and prevention of shock. Three dogs treated with 7 c.c. of albumin per kilogram lived, as did 6 dogs given 6 c.c. per kilogram, and one dog which received 5 c.c. per kilogram survived, Significantly, in those dogs that lived the average plasma volume was unchanged from the preoperative level (−7%), with a range from plus 10 per cent to minus 22 per cent. The albumin-treated dogs showed greater falls in antifibrinolysin titer and fibrinogen than did the untreated dogs, indicating that there was either greater activity of trypsin in the blood stream or that considerable dilution had occurred. In vitro, albumin possessed no capacity to inhibit trypsin.

Five patients with acute pancreatitis were treated with concentrated serum albumin, and received 200 c.c. daily until 800 to 1,200 c.c. had been administered. This was in conjunction with the usual supportive therapy, except that other intravenous fluids were withheld until after blood volume determinations. Patients so treated showed an increase in plasma volume immediately after albumin administration and it was believed that they experienced a rather early convalescence from the acute phase of the disease. With the expanded plasma volume, there was a fall in the antifibrinolysin titer which suggested that the albumin added an inert substance to the blood stream, so far as the inhibition of trypsin was concerned, and produced dilution of the circulating trypsin inhibitor and fibrinogen levels. The antifibrinolysin content of the human serum albumin now available apparently has been destroyed in its processing or in heat treatment for elimination of hepatitis virus, and if trypsin inhibition proves to be of value it will be necessary to find a method of preparation for albumin which preserves this factor.

—*James H. Holman, M.D.*

Observations Pertaining to the Place of Surgery in Acute Pancreatitis. JOEL W. BAKER and THOMAS BOLES. *Gastroenterology*, 1955, 28: 536.

SIXTY-SEVEN cases of acute pancreatitis observed during a ten-year period at the Virginia Mason Hospital constitute the basis of this article, in which the authors pose three questions of immediate concern to the surgeon confronted with the disease in its acute phase.

1. Does operative surgery have a place early in the acute phase?

2. If acute pancreatitis is found at laparotomy, should biliary decompression or retroperitoneal drainage be accomplished; or should the abdomen simply be closed?

3. Should surgery for acute cholecystitis be deferred because of an elevated serum amylase?

It is believed by the authors that early laparotomy is justified if the diagnosis is in doubt, and if associated jaundice is sufficient to suggest biliary tract obstruction. They also aver that the opinion of the majority is against early surgery on any other basis. An additional argument against early surgical intervention is the lack of agreement on what specific procedure to apply.

Anatomically, the pancreas is difficult to drain; thus, decompression of the biliary tract by choledochostomy or cholecystostomy is advocated on the assumption that further bile will be prevented from reaching the pancreatic duct if a common channel exists. Several cases are cited, which indicate that the extent of enzyme extravasation constitutes the single most important factor in determining the eventual degree of pancreatic necrosis.

Acute cholecystitis is found associated with acute pancreatitis in about 20 per cent of several reported series; of the authors' 9 surgical patients, 3 had definite acute cholecystitis and 3 had edema of the gallbladder. It appears logical to relieve an acutely inflamed gallbladder whether or not the serum amylase is elevated, if the patient is seen early enough for such surgery to prevent the more serious sequelae of cholangiitis or subhepatic abscess. To relieve early acute cholecystitis or bile duct obstruction should outweigh any possible ill effects on the pancreatitis, since the severity of the latter may well be determined by the initial extravasation of enzymes and not materially worsened by surgery.

In patients with recurring episodes of acute pancreatitis, surgical correction in the interim between attacks of existing biliary tract pathology is of first importance, and should include exploration of the common duct. Sphincterotomy is also finding an increasing number of advocates. Proof of a common channel by cholangiography should precede sphincterotomy, as well as probing the pancreatic duct at time of operation.

The authors discuss supportive therapy with the recommendation of replacement of blood volume loss; serum calcium levels and carbohydrate metabolism for insulin deficiency; relief of pain with agents which will not increase initial spasm of the sphincter; early splanchnic block; and continuous gastric suction to counteract ileus.

At operation, it is advocated that amylase studies on gallbladder bile and peritoneal transudate, bile culture, recording of the size of the cystic and common bile ducts, resistance of the sphincter of Oddi, and determination of the presence of a common channel by operative or postoperative cholangiogram be added to a careful description of the gross pancreatic involvement and extent of fat necrosis.

A brief review of the pathogenesis of the disease is included, with a discussion of the current theories regarding etiology. —*James H. Holman, M.D.*

Splenorenal Anastomosis by the Transabdominal Approach; a Description of Technique with a Report of 9 Cases. HUANG TS'UI-T'ING. *Chin. M. J.*, 1954, 72: 461.

THE AUTHOR presents a series of 9 cases observed in the Central People's Hospital, Peking, from April 1953 to February 1954. All patients suffered from portal hypertension as a result of intrahepatic obstruction due to nodular cirrhosis.

The technique of end-to-side splenorenal anastomosis is described. It is done by the transabdominal approach through a curved subcostal incision on the left side under continuous spinal anesthesia. With this approach, the exposure of the operative field is quite satisfactory, thoracic complications are less likely to develop, and the patients are much more comfortable postoperatively than when the thoracoabdominal approach is used; therefore, the authors believe it can be recommended for wider use.

End-to-side splenorenal anastomosis was done in 8 cases of portal hypertension from April 1953 to February 1954. An end-to-end anastomosis between the splenic vein and retroperitoneal collateral vein was done in another case. There was no operative mortality.

The follow-up period is still too short for a final evaluation of the operative results but the immediate reduction of the portal pressure could be observed in most cases.

Cases of portal hypertension with various clinical manifestations, such as esophageal varices, ascites, and congestive splenomegaly are indications for this type of operation provided there is no great impairment of liver function or the general health.

The importance of adequate preoperative preparation and proper postoperative management is stressed. The most frequent cause of portal hypertension in China is nodular cirrhosis of the liver which requires a long period of continuous medical treatment, and it is believed that close co-operation between the physician and surgeon in the management of such cases is of great importance. —*Edmund R. Donoghue, M.D.*

MISCELLANEOUS

Generalized Emphysema of the Deep Cellular Tissue (Enfisema generalizado del tejido celular profundo). RUIZ RIVAS. *Cir. gin. urol.*, 1954, 8: 171.

ROENTGENOGRAPHY following retroperitoneal injections of air was first done by the author in 1950 and in this article he presents a more mature evaluation of the procedure based on his further experience and the medical literature.

There have now been reported approximately 2,000 cases in which this method was used without a

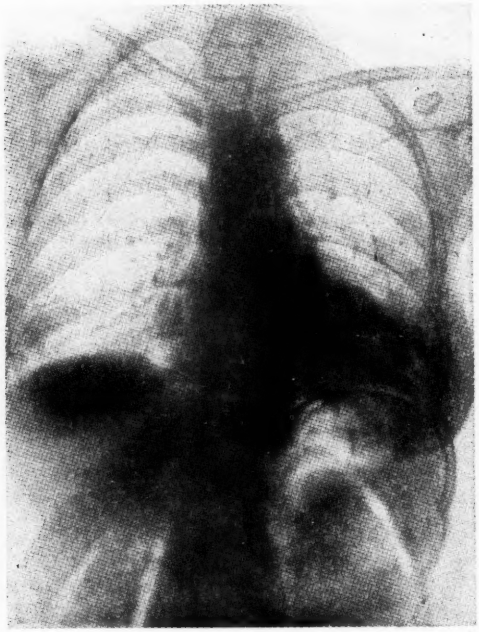

FIG. 1. (Rivas)

single complication. The technique may be safely used, provided that oxygen is employed, on the ambulatory patient. The manifestation which most troubles the patient is the emphysema in the cervical region; this can be avoided by keeping the patient in the reclining position during the examination. In the ambulatory patient bed rest is essential as soon as possible. Its advantages are increased by elevating the foot of the bed.

The author prefers oxygen for the injection; it is a physiological substance, and its rapid resorption and assimilation by the hemoglobin of the blood renders air embolism a practical impossibility when proper technique is used. The author disapproves of using air because of its nitrogen content. With reference to helium, he cites the experimental work of Donald R. Smith of the University of California who demonstrated the lengthy retention of the helium in the tissues.

The author does not agree with the workers who assert that generalized emphysema of the deep cellular tissue does not present anything new, since other authors had previously demonstrated the silhouette of the suprarenal capsules by means of gaseous contrast. There is an advantage in demonstrating both kidneys with one puncture, and further in demonstrating at the same time other organs, such as the liver, the spleen, and the gallbladder.

The author believes that the method of presacral gas insufflation as a means of producing an emphysema of the mediastinal tissue has not as yet been adequately utilized. One of his roentgenograms affords a perfect visualization of the two kidneys, the liver and spleen, the insertions of the diaphragmatic pillars, and a clear space represented by the emphysematous tissues between the pericardium and the diaphragm (Fig. 1).

All the organs of the pelvis may be demonstrated by means of presacral insufflation and adhesions existing between these structures and between them and the pelvic wall. The method provides the only means for demonstrating the ptotic, juxtapelvic kidney. —*John W. Brennan, M.D.*

GYNECOLOGY

UTERUS

Uterine Inversion and a New Method of Treatment (Die Inversio uteri und ein neues Verfahren zu ihrer Behandlung). R. Dyroff and J. Thomas. *Geburtsh. & Frauenh.*, 1955, 15: 126.

The first part of the article consists of a long review of the literature pertaining to the incidence, pathogenesis, and treatment of inversion of the uterus. There are different types to be considered. In local inversion a small part of the endometrial tissue is visible; in partial inversion only the uterine cavity is involved; in incomplete inversion, the uterine fundus is pressed through the cervical canal; in complete inversion the uterine fundus is totally visible through the cervical canal; there may be total inversion, or complete inversion with vaginal inversion. Pathogenically, the condition is divided as follows:

1. Puerperal or tocogenetic inversion is subdivided into acute, subacute, or chronic, and spontaneous or violent. The incidence reported in the literature varies from 1 case in 400,000 to 1 in 4,000. The causes are mainly excessive abdominal pressure in the third stage, improper traction on the umbilical cord, cervical lacerations, uterine malformations and difficult separation of the placenta. The spontaneous type is less frequently described in the literature; the causes mentioned are fundal implantation of the placenta, uterine hypoplasia, and anomalies in the innervation of the different uterine segments.

2. The incidence of nonpuerperal or oncogenetic inversion is lower than that of the puerperal type, and from 1928 to 1953 only 24 cases were reported in the literature. Myomas were the immediate causes in 22 cases, there was a sarcoma in 1 case, and a polyp in 1. Of the many theories presented to explain the mechanism of spontaneous inversion, the main theory appears to be that of the development of changes in the uterine musculature with resulting atony or atrophy.

3. The idiopathic type of inversion is not related to pregnancy, delivery, or the puerperium and there is also no evidence of tumors. It is seen mainly in older persons with some degree of prolapse.

With regard to symptoms, the degree of shock may be variable, depending on the suddenness of its appearance. The shock occurs not only as a result of the amount of blood lost—it is also neurogenic in origin. The total mortality among patients with the tocogenetic type of inversion is about 15.8 per cent and for the oncogenetic type, about 8 per cent. The diagnosis is usually easy to make in the puerperal stage if one has this possibility in mind. The oncogenetic and idiopathic types can be more easily overlooked because of a concurrent prolapse.

The method of treatment should be determined by the degree of inversion, the condition of the patient, and the time of the diagnosis. When shock is severe it may be advisable to use conservative measures until the condition of the patient is improved. A mortality up to 30 per cent is reported if reposition is attempted during shock; when reposition was done after treatment for shock the mortality was reduced to 5 per cent. Blood transfusions and circulatory supportive medication are necessary in the interim. Only when bleeding is very severe can reposition be life-saving.

A contraction ring or edema are difficulties to be expected in the conservatively treated cases; they can, however, be overcome by the administration of spinal anesthesia or adrenalin. After reposition a uterine tamponade is performed and uterine tonics are given. If this treatment is not successful, one may have to resort to vaginal hysterectomy.

Many operative procedures for repositioning and reinforcement of the uterus have been developed; the operations are done either abdominally or vaginally. The names of Haultain, Küstner, and Spinelli are familiar, but all procedures have their advantages and disadvantages. Successful pregnancies have been reported in many cases in which operative treatment was used and in none of these was a cesarean section performed.

In conclusion the authors report a case of their own in which a new method of treatment was used. The patient was a Para 2, 30 years of age, and inversion of the uterus occurred when manual removal of the placenta was done because of retention. Reposition was successful but inversion recurred 3 days later, accompanied by excessive bleeding; repeat blood transfusions and antibiotics were given until the patient was finally ready for surgical treatment 6 weeks later. The contraction ring was injected with 8 c.c. of kinetin; within 10 minutes a definite relaxation of the contracting was obtained. The operative procedure is described in detail. The patient was up on the tenth day and was discharged the seventeenth day. The use of a hyaluronidase preparation to relax the contraction has proved to be very successful. —*Robert O. Verheecke, M.D.*

Procuring Cells by "Superficial Abrasion" in the Early Diagnosis of Epithelioma of the Portio; Remarks with Reference to the Cytochemical Study of the Material Thus Procured (Il prelievo citologico per "abrasione superficiale" nella diagnosi precoce dell'epitelioma della portio; con un cenno introduttivo allo studio citochimico del materiale così prelevato). Piero Sora. *Riv. ital. gin.*, 1954, 37: 303.

In 76 female patients at the clinic of the University of Pavia, the author has been able, by means of classic vaginal and cervical smear examination combined with the superficial abrasion, or by the selective cervical scraping method of Ayre, to help clarify the nature of the morbid cervical condition. These cases were among 1,500 studied in the period from 1949 to 1954, with a total of 4,000 cytologic preparations.

Instead of the wooden scraper, or spatula, used by Ayre (*J. Am. M. Ass.*, 1948, 136, 513), the author has constructed a metal spatula with a broad spinous point at the bulbous end which has proved of use in scraping the depressions of irregular, perhaps ulcerated, cervices.

The staining of the smears so procured was done mainly by the classic method of Papanicolaou; in selected instances there were added the May-Gruenwald-Giemsa stain, the endocellular glycogen stains of Bauer, and the glycoprotein reaction of MacManus-Hotchkiss (periodic acid reaction of Skiff).

The spatula has made possible an exact diagnosis in 71 of the 74 cases (96%); with the traditional technique of the vaginal smear the error was 14.86 per cent. In the latter group there were 6 false negatives (including 2 "preinvasive" epitheliomas, 2 epitheliomas of stage 1, and 2 of stage 2), 5 false positives, and 15 were doubtful (20.27%). The group of 15 doubtful cases included 10 in which no malignant neoplasm was present, and 5 in which there were present epitheliomas of the portio in a more or less advanced phase. There were 9 cases in stage 3 in which the cytologic examination and the subsequent histologic examination served only to confirm an already obvious clinical diagnosis, 21 in stage 2, 5 in stage 1, and 3 in the preinvasive (stage 0) phase. There was 1 instance of epitheliomatous degeneration of a cervical mucous polyp.

In conclusion, the author states that he is firmly convinced that early diagnosis of cervical epitheliomas may be successfully accomplished with the prompt application and extensive use of selective cervical scraping (Ayre) combined with the other methods which have been shown to be of essential aid in confirming diagnoses (colposcopic and colpomicroscopic methods, and the histologic and histochemical methods of recent development). The author recommends that all techniques be utilized in the effort to increase our knowledge and aid in the early recognition of uterine cancer, a condition which still claims too many victims in every class of society.

—John W. Brennan, M.D.

Carcinoma of the Cervix in Nulliparous and Celibate Women. JANET E. TOWNE. *Am. J. Obst.*, 1955, 69: 606.

CONTRARY to the overwhelming reports in textbooks and in the literature, carcinoma of the cervix was found to occur in celibate women. The author reports 6 such cases following a comprehensive survey of approximately 13,000 celibate women. She admits that while the incidence of cervical carcinoma in this select group is small, yet to disseminate the idea that celibate or nulliparous women never develop cervical malignancies would be erroneous. Such misinformation creates the impression that it is unnecessary to suspect these women of having, or to examine them for, carcinoma of the cervix. It might also encourage surgeons to perform supracervical hysterectomies on these women, thereby making them susceptible to stump carcinoma.

The author also affirms the operation of etiologic factors other than cervicitis in the production of cervical carcinoma. *—Ely Elliott Lazarus, M.D.*

Studies on the Parametrium in Carcinoma of the Uterine Cervix; Histology of the Parametrium. ICHIRO NAKAMURA. *J. Jap. Obst. Gyn. Soc.*, 1954, 1: 23.

RECOGNIZING the difficulty in clinically differentiating between carcinomatous and inflammatory infiltrations of the parametria in cervical carcinoma, the author undertook a histological examination of the specimens removed by radical hysterectomy in 100 cases. Ninety-four of these were epidermoid carcinoma and the remaining were endocervical. Of the squamous carcinomas, 25 were in stage 1, 68 in stage 2, and 1 carcinoma was in stage 3. Two cases of endocervical cancer were in stage 1 and the others were in stage 2.

The author considered each side as an individual case and at laparotomy noted that 69 cancers had no palpable induration and 131 did have it. Of the former group 8.7 per cent showed histological evidence of malignant extension. The group of palpable indurations showed that 38.9 per cent were due to carcinomatous invasion.

The author reviews the literature on the histological examination of excised parametria and strongly urges wide extirpation. He includes several photomicrographs of the excised tissue.*—Henry C. Falk, M.D.*

The Treatment of Endometrial Carcinoma at the Women's Hospital of Basel (Die Behandlung des Korpuskarzinoms am Frauenspital Basel). J. BREITNER and U. ADLER. *Geburtsh. & Frauenh.*, 1955, 15: 113.

THE METHOD of treatment of endometrial carcinoma of the uterus at the Women's Hospital in Basel is either surgery or irradiation. In the authors' experience, a large number of patients have been poor surgical risks because they were seen too late. Treatment generally consists of total abdominal hysterectomy with bilateral salpingo-oophorectomy. The authors state that the vaginal approach has been discontinued since they found that vaginal metastasis occurred in a few cases. If there is extension of the lesion into the cervical canal a Wertheim procedure is performed. If treatment by irradiation is decided upon, the authors use the packing method, as in the Radiumhemmet of Stockholm. A total or 7,400 mgrh. is given in 3 sessions, at intervals of 2 to 3 weeks. Irradiation is given through four fields for a total dose of 8,000 to 10,000 roentgens (195 kv; 0.5 copper filter; 50 cm. focus; 300 roentgens daily).

The average age of the patients was 56 to 60 years; 10 per cent were over 70 years of age. Of the 179 patients in the series, 10 were inadequately treated because of cachexia or intercurrent death; 67 were operated upon and 102 were treated with radiotherapy; 16 cases of grade 0 carcinoma which were not included would naturally have improved this statistic because they are still living.

Among 82 patients treated from 1943 to 1948, the 5 year survival rate is 89 per cent and 29 per cent, respectively. Because of the increased death rate after 5 years for patients treated with radiotherapy, the authors believe that it would be advisable to operate upon these patients in 2 to 3 years after their initial radiotherapy. The results in other hospitals are presented for comparison; the majority of hospitals report a 5 year survival rate of between 45 and 60 per cent. The highest rate of survival is that reported by the Women's Hospital in Amsterdam, viz., 60 per cent.

The use of hysterography for better localization of the lesion and better application of the radium is reported and recommended. The article is accompanied by several illustrations, which are discussed.

—Robert O. Verheecke, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Primary Carcinoma of the Tube; Experiences Gained from Material (29 Cases) Seen at the Leipzig University Women's Clinic from 1937 to 1953 (Das primaere Tubenkarzinom; Erfahrungen an dem Material (29 Fälle) der Universitaets—Frauenklinik Leipzig in den Jahren 1937–1953). HEINZ BEHRENS. *Geburtsh & Frauenh.*, 1954, 14: 1107.

THE AUTHOR briefly reviews the literature on carcinoma of the fallopian tubes and the experience with this entity at his own institution.

The disease occurs usually in the fourth to sixth decades of life. Its etiology is unknown although it is thought to be related to previous salpingitis. The clinical diagnosis is difficult and is based upon vaginal bleeding without any discernible cause in the uterine cavity, so-called hydrorrhea profluens, and recently on a positive cytologic smear with a normal endometrial cavity. It is not unusual for a tubal carcinoma to be first noted as an inflammatory adnexal process.

Histologically, the cancer is frequently papillary or alveolar. It metastasizes early to the ovaries and the peritoneum. Later, spread to the lungs, the endometrium, and the other adnexa may be found.

Treatment is not standardized. Various combinations of surgery and irradiation have been utilized. Of the 29 cases reported by the author, 16 were followed up. Only 2 patients (12 per cent) survived 5 years or more. —*Warren R. Lang, M.D.*

Dysgerminoma, or Seminoma, of the Ovary (Disgerminoma [seminoma] del ovario). ARTURO VILLAAMIL MUÑOZ, *An. ginecotocol.*, 1953, 1: 93.

THREE instances of operation for dysgerminoma of the ovary are reported. These 3 cases seem to be the only cases reported from Uruguay. The author believes that a vast Latin-American material has escaped the attention of the medical world and thus has not had its proper effect upon the statistical status of the subject.

The first case history presented is one already published, as it was the first case seen in Uruguay, by Alvarez, Bentancur, and Soria (VI. *Jornad. Riop. Obst. y Ginec.*, 1946, p. 375). This case occurred in a 32 year old woman who was 2.5 months pregnant and who sought medical attention because of a huge, asymptomatic tumor in the right lower quadrant of the abdomen. At this time the diagnosis was dermoid cyst of the ovary.

At operation a right adnexectomy, including the tumor, was performed and the histologic diagnosis of dysgerminoma of the ovary was made.

Following the operation no roentgen treatment was instituted, the pregnancy was not interfered with and the patient has now survived for 10 years.

The second case history was that of a 17 year old nullipara with primary amenorrhea who consulted the author's service because of a rapidly increasing abdominal swelling with some pain. The syndrome had begun about 4 months previously.

Physical examination showed poorly developed breasts, scarce pubic hair, an infantile uterus and left ovary (hypoplastic), and other evidence of arrested development of the genital organs, and, finally, a huge firm, nodulated tumor, extending upward to the level of the umbilicus.

At operation the tumor seemed to be perfectly encapsulated, movable, and incorporated with the right ovary. A right adnexectomy was performed and the operation was followed by roentgen therapy. The patient has now survived 2 years.

Histologic examination of the removed tumor disclosed the presence of a typical dysgerminoma.

The third case (unpublished) was given to the author for publication by Nin and Silva. In this case a 25 year old secundipara consulted Colombo because of a subacute abdominal syndrome which had begun 8 days previously.

At operation a small amount of serosanguineous fluid was discovered in the abdominal cavity (torsion of tumor pedicle) and a huge, firm, elastic abdominal tumor incorporating the right ovary. A right adnexectomy was performed and the operation was followed by roentgen therapy.

Histologic examination of the removed tumor disclosed the presence of a typical dysgerminoma. The patient has now survived for 3 months without evidence of recurrence or metastasis.

—*John W. Brennan, M.D.*

Unusual Malignancy in An Instance of Sarcomatoid Arrhenoblastoma of the Ovary (Sulla eccezionale malignità di un caso di arrenoblastoma sarcomatoide dell'ovaio). LUIGI MELONI. *Riv. ostet. gin.*, Firenze, 1954, 9: 820.

A THIRTY-YEAR-OLD woman had been married for 4 years without becoming pregnant. She had not menstruated until 18 years of age and her periods had been scanty and painful. She was tall and thin with poorly developed breasts; she had a hypertrichosis of the upper lip and chin, although this hirsutism could not be ascribed to the present ailment; it may have been congenital.

The patient entered the author's service on July 24, 1951 with a tentative diagnosis of torsion of an ovarian tumor. During the first half of July she had noted an enlargement of the left lower abdomen, and on the fifteenth of the month severe pains appeared in this area. There was a subfebrile temperature.

When the abdomen was opened there was found a pedunculated ovoid mass, 18 by 11 by 9 cm., with a smooth surface free from adhesions. The pedicle was cut and the mass removed, without removing the opposite ovary or the uterus.

On the tenth postoperative day a resistance to palpation could be detected in the right lower quadrant of the abdomen. The patient was discharged but instructed to return in 10 days. At the appointed time she returned complaining of persistent pains in the right lower quadrant. Palpation disclosed a mass extending from the pelvic region to a finger's breadth above the transverse umbilical line, and apparently adherent to the abdominal wall.

At a second laparatomy, 4 days later, there was uncovered a mass filling the right lower quadrant; it was long, cystic above and solid below, grossly nodulated, and adherent to the body of the uterus and pelvic wall. The mass, with the salpinx, was removed; the uterus was left to permit radium applications.

When the patient was again discharged from the service, 10 days later, a new mass, hard, and the size of a hen's egg, had formed on the right side. The patient was referred to the radium-roentgen therapist for intensive treatment. Sixteen days later she died. Histologic examination showed a typical sarcomatoid arrhenoblastoma.

This case is exceptional because of the rapid course. Only 62 days elapsed between the first surgical intervention and death, despite massive radiation therapy and two surgical interventions. Although discouraging, such an outcome must not prevent the surgeon from applying strictly the three measures which up to the present have proved most effective: early diagnosis; as radical an operation as possible, even in those instances in which malignancy is only suspected; and postoperative irradiation.

—*John W. Brennan, M.D.*

EXTERNAL GENITALIA

Carcinoma Vulvae (Carcinoma vulvae). M. DEKARIS and M. GRGUREVIĆ. *Acta chir.*, Zagreb., 1954, 3: 191.

NINETY-TWO VULVAL CANCERS have been treated at the Gynecologic and Obstetric Clinic of the Faculty of Medicine of Zagreb in Croatia. The discussions are largely taken from those published by E. Berven (*Acta radiol.*, 1941, 22: 99; abstract in INTERNAT. ABST. SURG., 1941, 73: 240). This subject was more comprehensively dealt with by Berven in 1949 (Brit. J. Radiol., 1949, 22: 498).

The authors, in evaluating their material, divide it in the four groups and three stages as proposed by Berven. In group 1 (4 cases) the tumor was limited to one area of the vulva and gave no evidence of ulceration; in group 2 (24 cases) there was the same extension and distribution as in group 1, but with the presence of ulcerative changes; in group 3 (35 cases) the neoplasm no longer was limited to its original place of development but was invading the neighboring structures of the vulva; in group 4 (29 cases), the new growth had spread widely into the tissues of the vulva, infiltrating the vagina, perineum, and the surrounding skin, or had invaded the inguinal region by continuation.

In stage 1 there was a small, mobile tumor and normal or, at most, inflammatorily enlarged lymph glands; in stage 2 there was invasion of the lymph glands and a suspicion of metastasis, and in stage 3 there was absolute certainty that inoperable metastases were present.

There were 10 patients who were treated with local application of radium to the vulva and roentgen therapy of the lymphatic glandular areas. In this material there was one 5 year survival (group 1; stage 1); there was a primary mortality of 3, and the remaining 7 patients died of cancer before 5 years were passed.

Twenty-two of the patients were treated by local cauterization of the tumor and radium moulage of the vulva and lymphatic glandular regions. In this group there were no 5 year survivals; there was a primary mortality of 3 and the remaining patients died within the first 5 years.

Four of the patients were treated by radium and roentgen irradiation (Chaoul) and by excision of the lymphatic glandular areas. In this group there was one 5 year survival; there was a primary mortality of 1 and the remainder of the patients died in from 1 to 5 years.

Three of the patients were treated by vulvectomy, without irradiation or excision of the lymph glands (these patients refused other treatment). Here there was a primary mortality of 1, and the 2 other patients disappeared from view.

Eight of the patients were treated by local application of radium, vulvectomy with diathermy, and excision of the lymph nodes. In this group there were four 5 year survivals; the primary mortality was 1, the remainder of the patients dying in from 1 to 5 years after operation.

Thirty-five of the patients were treated by vulvectomy with diathermy and excision of the lymph glands, with or without roentgen irradiation, but radium was not used. In this group there were twenty-two 5 year survivals; the primary mortality was 5; 7 patients died from cancer in from 1 to 5 years, and 1 patient was lost to view.

Nine of the patients were treated by electrocoagulation of the vulva with either roentgen irradiation and/or excision of the lymphatic glandular areas. In this group there were six 5 year survivals; there was an immediate mortality of 1; 1 patient died before the 5 year interval was up and 1 was lost to view.

Thus, it is evident that the operative method of Berven (bipolar, total electrocoagulation of the vulva), with its 66.6 per cent of 5 year survivals and its primary mortality of 11.1 per cent, has given the best results.

For the future, however, the authors put most faith in a campaign of enlightenment of the public, aimed at bringing these patients to the physician at an earlier stage of their disease. The present discouraging condition of affairs is reflected numerically in the 31.5 per cent of patients in group 4 and the 52.2 per cent in stage 3.

—*John W. Brennan, M.D.*

MISCELLANEOUS

Genital Prolapse with Elytrocele (Les prolapsus génitaux avec élytrocèle). HENRY G. ROBERT. *Rev. fr. gyn. obst.*, 1955, 50: 47.

AN ELYTROCELE is a hernia of the intestines prolapsed into the cul de sac of Douglas and protruding through the posterior vaginal wall and the vulva. The hernial sac may be formed by the cul de sac itself. The abdominal contents may exercise pressure in a deep cul de sac, very often present after corrective surgery for retroversion or retroflexion of the uterus. Cervicopexies after subtotal hysterectomies widen the uterosacral ligaments and favor the formation of a cul de sac hernia. Sometimes a congenitally deep cul de sac may be present. The differentiation between a true elytrocele and a false cul de sac hernia, which actually is a rectocele, is sometimes very difficult. A deep cul de sac associated with an exteriorized prolapse can rupture under pressure and expose the intestines.

The hernial sac may be a diverticulum of the cul de sac. Meigs has described a cupular depression under the insertion of the uterosacral ligaments on the cervix. The same has been observed by the author and

has been found to be so long that it practically had a pedicle. The pedicle is located above the levator muscles. A resection of this herniated part might not be sufficient, because there is still a deep cul de sac present which will eventually cause a posterior colpocele, an elytrocele, or isolated rectocele.

Next is studied the location of the hernia. In regard to the pedunculated hernia one has to consider that behind the pedicle there is still a large sac present that has to be repaired. Further, considering that the levator muscles separate the pelvis from the perineum, two anatomical pictures have to be studied. First, the elytrocele which has pushed through the levator muscles, and, second, the large separation of the levator muscles itself. The true herniated sac is sometimes not excised when one brings only the levator muscles together.

Are a prolapse and an elytrocele present at the same time or not? When a prolapse is exteriorized both are usually present. However, if there is only a bulging of the posterior vaginal wall, a rectal examination should determine if the herniation is an elytrocele or only a rectocele. A false interpretation might result because of the fact that the patient on the examination table, has no intestines in the herniated part. A few authors have recommended a hysterosalpingogram as a diagnostic procedure. Because of the many contraindications this procedure cannot always be performed.

The author further questions if the surgical repair of the prolapse might cause an elytrocele. If the repair is done vaginally, it does not, but if the repair is done abdominally, it will. A ventrofixation or cervicopexy opens the cul de sac and favors the formation of a hernia. That can be prevented if one closes the cul de sac at the same time, preferably with a nonabsorbable suture. Ameline and Huguier have recently performed posterior hysteropexies which have aroused a lot of discussion; these workers seem to be satisfied with their results.

During total hysterectomies the vaginal corners are suspended to the round ligaments, and to prevent an elytrocele the cul de sac is closed or a vesicorectal closure of the pelvis is performed. In subtotal hysterectomies a cervicopexy (Funck-Brentano) is done with either the adnexal stump or the round ligaments. The cul de sac has to be closed if it is accentuated. In the course of a perinorraphy one has to be on the alert to recognize a possible elytrocele and therefore a large incision exposing the entire posterior vaginal wall is necessary.

How should an elytrocele complicating a prolapse be treated? First is considered the common prolapse and here in particular the pedunculated elytrocele. They have to be treated as sessile hernias and of the four possible ways, the author considers the combined vaginal and abdominal route is the most successful. During the vaginal procedure one has to free the cul de sac and possibly only ligate the herniated part. In difficult cases one has to open the cul de sac and proceed from above. The prolapse evident after a subtotal hysterectomy is studied next. In indicated cases an amputation of the cervix is considered; sometimes a cervical amputation with colpectomy was advised, but the results have been unsatisfactory. A cervicopexy performed abdominally has resulted in a cystocele, so that now usually a cervicopexy is performed by both routes. Vaginally an anterior and posterior repair is performed with special consideration of the cul de sac.

The treatment for an elytrocele developed after a subtotal hysterectomy with cervicopexy should be as follows: vaginal ligation of the cul de sac; the levator muscles are brought together and a perineoplasty is done; abdominally, an attempt is made to close the cul de sac.

One has to expect a certain number of failures. The true anatomical response of the perineal structures to our repair is hard to foretell, because factors such as hormones, circulation, and trophic conditions of the tissues might play a role which is not under our control. —*Robert O. Verheecke, M.D.*

Douglas Pouch Hernia (La hernie du Douglas). M W. GEISENDORF. *Bull. Fed. Soc. gyn. obst.*, 1954, 6: 571.

AFTER PRESENTING 3 cases of hernia of the pouch of Douglas, the author discusses the three common types of this hernia.

The first one is named the pure vaginal hernia. This is a congenital anomaly resulting from the failure of the primitive genitorectal layers of the cul de sac, which descend to the perineum, to coalesce. Only the posterior vaginal wall protrudes; generally women with multiple hernias, visceral ptoses, and a relaxed abdominal musculature are prone to this condition.

The second type is the hernia associated with genital prolapse. The cul de sac is pulled downward with the prolapse of the vagina and is sometimes filled with intestines.

The third type is the hernia appearing after surgical repair of genital prolapse. After the repair the abdominal pressure will cause, with relaxation of the uterosacral ligaments, an increasing cul de sac which results in an enterocele.

Ameline after a study of 18 cases classified his observations in two categories: (1) the sliding type of elytrocele, in which the base of the cul de sac slides down with the protruding posterior vaginal wall; and (2) the tension type of elytrocele, which appears after some of the corrective types of surgery on the uterus. The best way to diagnose an elytrocele is to keep its possibility in mind, and to investigate the presence of a herniated cul de sac during a posterior repair.

The recommended treatment is to perform, abdominally, a closure of the deep cul de sac, and, vaginally, an adequate perineorraphy with investigation of a possible Douglas pouch hernia.

—*Robert O. Verheecke, M.D.*

Comparative Evaluation of the Colpocytologic Examination and of the Titer of the Urinary Steroids in Functional Gynecologic Diagnosis (Valutazione comparativa degli esami colpocitologici e dei dosaggi degli steroidi urinari nella diagnostica funzionale ginecologica). A. BOMPIANI and P. SORA. *Arch. ostet. gin.*, 1954, 76: 939.

THIS STUDY was conducted on 107 women admitted on the obstetric and gynecologic service of Prof. Massazza at the University of Pavia, Italy. In this material there were 13 instances of biphasic cyclus (a prac-

tically normal menstrual cycle), 4 of severe amenorrhea and 12 of mild amenorrhea, 12 of hypo-oligomenorrhea, 13 of hypoplastic uterus, 7 of polymenorrhea, 24 of menometrorrhagia, 9 of hyperfolliculinism, 4 of hypertrichosis, 3 of nonfunctioning ovarian tumor, and 6 instances of disturbances of the climacterium.

In a previous article the biochemical findings were compared with the clinical symptoms; here the findings on the steroids and pregnandiol of the urine are compared with the vaginal cytology (after the method of Papanicolaou and of Shorr).

The authors find on the whole that there is a certain amount of parallelism between these various findings, and also between these and the findings on the curetted specimens of endometrium. Here the endometrial findings seem to be more closely linked to the urinary excretion of the estrogens, and the colpocytologic findings with the urinary excretion of the steroids; however, it appears that the variations in the colpocytologic counts and the titers in the urine of the estrogens and steroids tend to take place in the same direction. Nevertheless it is considered that the absolute value of the average findings are insufficient for a rigorous definition of the metabolism of the urinary phenolsteroids and the colpocytology, such as would constitute a means of diagnosing the form of dysfunction present. More specifically, the directions of variation of both the phenolsteroids and the colpocytology seem consistent with the findings indicating the metabolic changes of the estrogenic titer.

—*John W. Brennan, M.D.*

Management of Pelvic Endometriosis. GEORGE H. GARDNER. *Obst. Gyn.*, 1955, 5: 538.

PRESENT DAY MANAGEMENT of pelvic endometriosis can be divided readily into four distinct categories: watchful expectancy, hormone therapy, surgical interference, and x-ray irradiation. Each has a field of greatest usefulness and of particular effectiveness; at the same time, each one also has distinct limitations in its applicability to individual patients.

In general, such selection is determined (1) by the conditions under which endometriosis is first recognized, (2) by the type and severity of the symptoms, and the extent of the pelvic pathology, and (3) by the objectives of management.

Irrespective of the specific type of treatment selected, its objectives fall into one or more of three general categories:

1. Prophylactic. Some therapy is considered prophylactic, at least in part, because its aim is to prevent the genesis of further endometriosis, preclude the spread and progressive development of residual lesions, or avert the later development of cancer in them.

2. Palliative. Other types of management are distinctly palliative, since they include watchful expectancy by continued observation through repeated office consultations and regular examinations; temporary inhibition of cyclic activity in the ectopic endometrium (with relief from symptoms therapy) either through hormone therapy or by subcastration doses of x-ray irradiation: and so-called conservative surgery, by which the childbearing function is preserved and as much as possible (but usually not all) of the endometriosis is resected.

3. Definitive. Other procedures are definitive, when permanent castration is accomplished, either by x-ray irradiation or by removal of the ovaries (together with the uterus and tubes). On the other hand, hysterectomy and removal of most of the endometriosis without castration should not be considered as definitive management; some patients so treated experience further trouble from their residual endometriosis and require further treatment.

A rigid, didactic approach to these problems of treatment would be disastrous, because they include so many variables and so much that is both theoretical and controversial. Not only do the symptoms and the disease process vary considerably from patient to patient; in addition, there is little correlation between the pelvic involvement and the type of severity of the symptoms. Some lesions spread rapidly and progressively; others are not only asymptomatic but also appear to be totally inert.

The absolute necessity for strict individualization of these patients becomes obvious.

—*John R. Wolff, M.D.*

Stilbestrol-Induced Hyperhormonal Amenorrhea for the Treatment of Pelvic Endometriosis. ARTHUR L. HASKINS and RALPH B. WOOLF. *Obst. Gyn.*, 1955, 5: 113.

THE TREATMENT of endometriosis may be surgical, medical, or roentgenologic; each method has its own proponents. The authors present a series of cases in which they used stilbestrol to produce hyperhormonal amenorrhea. The method suggested by Karnaky was employed, i.e., progressive increase in the dosage of stilbestrol to a daily dose of 100 mgm., then a systematic decrease in daily dosage to none.

The presenting symptoms were those normally elicited: acquired dysmenorrhea, rectal pain during menses, chronic pelvic pain, dyspareunia, rectal bleeding during menses, and recurrent umbilical discharge.

The sites of the endometriosis were: the uterosacral ligaments in 13 cases; cul-de-sac in 5; the ovary in 4; rectovaginal septum in 3; umbilicus in 1 case; and the cervix in 1.

All of the patients were urged to return for frequent check-up examinations. The shortest period of observation was 7 months, the longest 46 months. Marked changes were observed. Amenorrhea was a constant finding. Some patients had withdrawal bleeding 2 days after the treatment. The symptomatic response was similar to that of pregnancy—immediate remission of the symptoms caused by endometriosis. Nausea and vomiting occurred in most patients for varying periods up to 10 days. Fullness and tenderness of the breasts, and pigmentation of the areola were noticed; no serious vaginal bleeding occurred; the vaginal mucosa and cervix became bluish; and the size of the uterus enlarged to that of a six weeks' pregnancy.

The endometrium did not become atrophic during the treatment but did become softer and less tender. The pelvic viscera became more mobile.

The average number of days of treatment was 190. The symptom-free days of all patients averaged 616; the symptom-free days of those without recurrence was 626. Four patients had recurrent symptoms, and

their average number of symptom-free days was 542. Three patients became pregnant following the treatment.

The authors conclude that this method of therapy has many advantages to the patient and very few disadvantages, its main mode of action being similar to that of a pregnancy. —*James F. Donnelly, M.D.*

Foreign Body Granulomas Following Hysterosalpingography with a Contrast Medium Containing Carboxymethyl Cellulose. F. BERGMAN, G. GORTON, O. NORMAN, and S. SJÖSTEDT. *Acta. radiol.*, Stockh., 1955, 43: 17.

HYSTEROSALPINGOGRAPHY has become an increasingly important diagnostic procedure in gynecology. Various agents were used for this purpose, the most popular of these being lipiodol. This substance has recently fallen into disrepute, however, because it involves the risk of producing foreign body granulomas, emboli, and inflammatory changes in the tubes and uterus.

Since 1942, in Sweden, it has been the rule to use water-soluble contrast media in place of lipiodol. The disadvantage of these water-soluble contrast media, is however, that being thin, they often pass through the uterine cavity and tubes quickly and thereby diminish the possibility of detecting the presence of any abnormalities. In order to overcome this disadvantage, numerous thickeners for increasing the viscosity of the water-soluble media have been used. One of these was carboxymethyl cellulose. Investigations were carried out on operatively removed specimens that had previously been studied with water-soluble media and carboxymethyl cellulose.

Foreign body granulomas were demonstrated in 16 out of 18 patients following hysterosalpingographies with a contrast medium containing carboxymethyl cellulose. Eight lesions were in the uterus, 2 in the tubes, and 7 in the ovaries. It was demonstrated that the granulomas were due to the carboxymethyl cellulose content of the contrast medium, and the authors advise against using this substance in hysterography in women, especially those of fertile age.

—*Ely Elliott Lazarus, M.D.*

The Incidence of Extragenital Interventions Observed on the Gynecological Operating Table; Clinical and Anatomopathologic Case Reports (Incidenza di interventi extragenitali osservati sul tavolo ginecologico. Nota di casistica clinica ed anatomopatholgica). GERMANO FERRARIS. *Minerva gin.*, Tor., 1955, 7: 14.

THE ESSENTIAL MOTIVE for republishing this series of case reports is to warn the gynecologist that if he is to perform major surgery in gynecology he must be prepared to carry out supplementary or original procedures on organs and in regions which are generally conceded to be the rightful field of the general surgeon. The author emphasizes the view that the gynecologist cannot in conscience close the wound because he considers the extragenital condition too difficult to rectify; he must be prepared to do anything that the general surgeon can do.

Sixteen case histories have been collected from the gynecologic clinic of the University of Perugia, Italy, in the course of the past 9 years. Included is 1 case each of adenocarcinoma of the sigmoid colon, reticulosarcoma of the small intestine, carcinoid of the appendix complicating multiple fibromas of the uterus, retrocolic gangrenous appendix in the sixth month of pregnancy, 2 cases of intestinal occlusion as a result of the spread of malignant genital neoplasm, 2 cases of accidental rupture of the colon in instances of abscess of the genital organs, 1 case of postoperative fistula of the abdominal wall in an obese patient (the fistula was excised successfully and a lipectomy of the abdominal wall performed), 2 cases of accidental division of the left ureter, 1 case with deliberate resection of the left ureter involved neoplastic infiltration, 1 case in which rightsided nephrectomy was done for hypoplastic malformation, 1 case of cyst of the right renal lobe, and 1 case of retroperitoneal myxoliposarcoma.

These 16 patients comprised a group selected from 2,300 celiotomies. Excluded were the usually incidental complementary extragenital operations, such as hernial repairs, repairs of minor intestinal injuries, etc., and in all these cases a gynecological condition was wrongly diagnosed or the extragenital pathology was discovered as an unsuspected finding when the gynecological procedures were carried out.

—*John W. Brennan, M.D.*

Present-Day Indications and Limitations of Hibernotherapy as Applied in the Obstetric and Gynecologic Clinic (Indicazioni e limiti attuali della ibernoterapia applicata in clinica ostetrica e ginecologica). GUISEPPE VALLE. *Minerva gin.*, Tor., 1955, 7: 136.

TWO YEARS AGO, Valle *et al.* reported on the results obtained and the experience gained from the extensive use which has been made, during the past few years, of the method of hibernotherapy in the fields of gynecology and obstetrics at Perugia, Italy. An abstract of this report appeared in the INTERNATIONAL ABSTRACT OF SURGERY (1954, 99: 168).

Since then this method, which the author designates a neurovegetative disconnection, has been used in 70 additional patients. These included 34 to whom it was given for the prophylactic and therapeutic management of shock, 3 with gynecologic and obstetric infection, 10 with eclampsia, 7 with hypertension of pregnancy, 3 with hyperemesis, 9 with dynamic dystocia, and 8 with neonatal asphyxiation. This excluded those with less serious conditions, in whom it was used for pre-anesthetic medication or obstetrical analgesia for which the entire procedure was not considered necessary. These 70 patients comprised part of an entire material, observed during this period (14 months), of 357 celiotomies for obstetrical or gynecological conditions, 1,525 minor obstetrical and gynecological vaginal interventions, and 529 spontaneous deliveries.

In the adult group, counting the one decrease reported in 1953, there were 3 deaths with this method, and in the group of 8 asphyxiated newborn, mostly premature children, there were 4 deaths. The author's impressions as to the causes of these deaths will be mentioned under the discussion with reference to indications and contraindications.

As mentioned, the author's service has not thought it necessary to use the entire armamentarium of phar-

macological neurovegetative disconnection combined with artificial refrigeration (ice-bags), and have not routinely applied all of the antalgics and hypnotics, histaminolytics, acetylcholinolytics and sympathicolytics of the classic method, but have applied them alone, or in various combinations in accordance with the type of reaction and general make-up of the individual patient. Most dependence has been placed upon chloropromazine, or thorazine, and all sorts of other drugs and moduses have been applied (digitalis; transfusions; fluid administration; antibiotics) as they have seemed indicated.

From his experiences, gained with this material, the author, reluctantly and tentatively it is true, suggests the following conditions in which he believes that the method of neurovegetative disconnection (hibernotherapy) might prove to be of value. First to be considered for the application of the method are the major complications in obstetrics and gynecology, such as the rupture of an intestinal loop in cases of criminal abortion (this condition accounted for one of the deaths here reported), uteroplacental apoplexy, the grave syndromes of hemorrhage, and all those affections in which shock is present or is reasonably to be anticipated. The same considerations apply in the complications of the same nature as the above which are of less desperate a character but which occur in the aged individual or in patients whose general condition is compromised as a result of myocardial, thyroid, renal, or hepatic pathology.

In instances of eclampsia with recurrent crises this therapy is to be considered as an emergency measure to control the immediate peril until the causal condition can be otherwise attacked. Hibernation cannot be considered in the light of an etiologic therapy in these patients.

Although frank doubt is expressed as to the value of the method in the treatment of the asphyxiated newborn infant (as mentioned, these infants are also usually premature)—representing as it does a method of treatment which runs absolutely counter to the classic procedures—the method may nevertheless be considered for the prophylactic management of mothers during the period immediately preceding or in the course of delivery, whose children are threatened with asphyxia by some disturbance of the placental function (dynamic dystocia, in which the uterus is tonically contracted, or threatened interruption of pregnancy).

The method may also be tried as a preanesthetic medication in patients of poor general condition, as a potentiator of other anesthetic moduses. Excepted are, of course, those instances in which immediate evacuation of the uterus is proposed.

Other possible indications for the method are the psychosomatic syndromes and the psychic disorders in the course of obstetric and gynecologic affections, as well as obstetric analgesia during the period of dilatation of the cervix.

The method of hibernotherapy is of doubtful value in puerperal tetanus; nevertheless, it may be considered for patients who are perhaps going to die anyhow, but in whom the euphoric character of the method might be utilized to spare the patient the horror of the death agony while in a state of perfect mental lucidity. Puerperal tetanus was responsible for the only other adult death with this method which has occurred since 1953.

Patients in whom the intervention is not of a serious character, and well-prepared and robust individuals to be subjected to the enlarged Wertheim operation for malignancy furnish contraindications to the method, and it is superfluous to use it for the immediate extraction of the fetus.

Thus, it is seen that the viewpoints of the author have not essentially changed since 1953; it is only that his experience since that date has broadened and deepened. —*John W. Brennan, M.D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

An Assessment of the Value of Antenatal Radiologic Pelvimetry Based on 500 Successive Pelvimetric Examinations. G. W. PIMBLETT and T. G. E. WHITE. *J. Obst. Gyn. Brit. Empire*, 1955, 62: 17.

THE AUTHORS believe that antenatal roentgenological pelvimetry and cephalometry can provide accurate information on the cephalopelvic relationship which exists or is likely to exist at or near term.

This work is based on 500 consecutive cases examined in a 2.5 year period in a large obstetrical unit.

The technique is described and explained, including the method of measuring the fetal head.

When possible, all examinations were done in the thirty-eighth or thirty-ninth week of gestation and, when done, earlier proper corrections were applied.

The measurements of the fetal head were checked after birth and showed a difference of 0.2 cm.

The authors claim that it is impossible to measure the true conjugate accurately clinically except when gross contraction exists.

They also infer that clinical judgment is inaccurate as 60 per cent of the cases sent to them for pelvimetry because of suspected disproportion were normal.

They set up and explain three classifications of cases based on whether normal or operative delivery might be expected, and evaluated their predictions.

They report a 97 per cent accuracy in prediction.

—*Byford F. Heskett, M.D.*

A Clinical Study of Pre-Eclampsia. T. R. NELSON. *J. Obst. Gyn. Brit. Empire*, 1955, 62: 48, 58.

THE AUTHOR reviews and discusses pre-eclampsia in the Aberdeen Maternity Hospital.

He sets up criteria for diagnoses and determines their incidence in the cases studied. He also studied pre-eclampsia from the point of view of age, social class, height of the patient, and excessive weight gain. The over-all incidence was 20 per cent.

From his point of view, he states that severe and mild pre-eclampsia under its present definition may not be the same disease, particularly after the age of 30 years. The incidence of mild disease increases markedly over the age of 30.

The incidence of the disease is the same in all classes, is not affected by the height of the patient, or, probably, by the physical development or general health.

Excess weight gain during the twentieth to thirtieth week period is associated with an increased risk of severe pre-eclampsia under the age of 30 and mild pre-eclampsia in all ages.

The author discusses in a second phase of his study the question of eclampsia in the light of modern brain studies and the threshold of convulsive stimuli. He does not agree with the concept that eclampsia always follows severe toxemia, but states that the danger of eclamptic seizures is determined by the severity of the pre-existing pre-eclampsia and by the standard of treatment which the patient has received up to the time of the convulsion.

He states that the incidence of pre-eclampsia has not decreased by increasingly strict standards of care, but has increased; however, he believes that eclampsia is preventable by increased standards of care.

—*Byford F. Heskett, M.D.*

Hexamethonium Chloride and Apresoline in Toxemia of Pregnancy; a Preliminary Report. JOHN R. ASHE, JR., and WALTER L. THOMAS. *Obst. Gyn.*, 1955, 5: 325.

THE AUTHORS present a preliminary report on the results of treatment of toxemia of pregnancy with two hypotensive agents.

Apresoline appears to block vasopressor substances in the region of the midbrain and partly to inhibit epinephrine, norepinephrine, and certain other hypertensive agents of the body. It also produces a significant increase in renal and coronary bloodflow and cardiac output while decreasing the cerebral vascular tone without reducing the cerebral bloodflow. The most common side effects are: headache, tachycardia, nausea, and vomiting. Caution is advised in the presence of renal insufficiency, cardiovascular damage, and coronary artery disease.

Hexamethonium chloride is a ganglionic blocking agent by its action of raising the threshold of sympathetic and parasympathetic ganglia to acetylcholine. The effects consequently are: fall in the blood pressure, inhibition of secretion and peristalsis in the gastrointestinal tract, increased blood flow and skin temperatures in the extremities, and disturbances in the accommodation of the eyes. All these effects may easily become excessive and sometimes lead to postural hypotension, syncope, fetal anoxia, thrombotic phenomena, aggravation of pre-existing renal insufficiency, urinary retention, and paralytic ileus. Because of these dangers and, particularly, the high incidence of intrauterine fetal anoxia and death, and also the rebound phenomena after sudden withdrawal of the drug, the authors abandoned the use of it after this experimental study.

In this series the two drugs were administered, either alone or in combination, to 40 patients for a total of 56 treatments. Oral medication was avoided because of the unpredictable absorption rate from the gastrointestinal tract and the difficulty of removing remnants in the bowel if sudden side effects developed.

All patients were hospitalized, placed on bed rest and a low salt diet, and worked up completely from the point of view of renal dynamics. Groups were formed of six different diagnoses of pre-eclampsia, eclampsia, and/or pre-existing hypertensive disease of the vascular, cardiovascular, or cardiovasculorenal variety (not explained in detail). Sedation was given only to control or prevent convulsions. A test dose of the drug was always given first to determine individual sensitivity, and a rational schedule of medication

was then instituted (usually every 2 to 4 hours) with the dosage guided by blood pressure responses. If the drugs were combined, fewer side effects seemed to occur and tolerance did not develop as often and as fast. All patients were supervised as to fluid balance, weight, albuminuria, and blood chemistries.

The results in the six groups are difficult to evaluate because of very few statistical figures and the absence of an untreated control group, even though details of all cases are given. There was no maternal mortality, including a case that progressed from pre-eclampsia to eclampsia while under hypotensive therapy in the hospital. The over-all fetal mortality rate was 41 per cent, for eclampsia 83.3 per cent, and for cardiovasculorenal disease 100 per cent. Twelve antepartum deaths during drug therapy make further studies on possible ill effects of these drugs on the fetus mandatory. It may, on the other hand, be possible that hypotensive agents increase the duration of pregnancy, and so indirectly reduce the fetal mortality from prematurity.

While apresoline was safer to use, a more satisfactory, and sometimes dramatic clinical response was often seen with hexamethonium chloride. The authors are aware of the limitations in their studies and wrote this preliminary report to stimulate further work on a treatment which has not yet proved to be the absolute answer to the problem of irreparable maternal damage and high fetal mortality in toxemia of pregnancy.

—W. D. Bergman, M.D.

Fibrinogenopenla Complicating Pregnancy; Clinical and Laboratory Studies. DUDLEY P. JACKSON, ROBERT C. HARTMANN, and TRENT BUSBY. *Obst. Gyn.*, 1955, 5: 223.

THE AUTHORS present 10 cases of hypofibrinogenemia associated with pregnancy. Thorough hematological examinations were performed in each case to determine the hematocrit count, platelet count, bleeding time, clotting time, capillary fragility, clot retraction time, prothrombin time, fibrinogen level, the plasma fibrinolytic activity, the circulating anticoagulants, and the prothrombin consumption. The details of the various tests are described.

Of the 10 cases, 7 were associated with premature separation of the placenta, 1 with an amniotic fluid embolus, 1 with septic abortion, and 1 with a retained dead fetus. Ten other cases of obstetrical complications including premature separation of the placenta and death in utero are summarized; they showed no coagulation defect.

Of the cases of premature separation none had afibrinogenemia, but all had levels below 108 mgm. per 100 ml. Six of these 7 cases showed thrombocytopenia. Five of this group showed prothrombin deficiency. None showed increased fibrinolytic activity and the authors postulate that the hypofibrinogenemia is a result of increased utilization of the fibrinogen. Not all of the patients received fibrinogen because of the relative unavailability of the material.

The authors emphasize that hemorrhage may occur in the absence of coagulation defects, and hypofibrinogenemia may occur without bleeding. They believe that coagulation defects are rapidly removed following evacuation of the uterus.

The literature of hypofibrinogenemia is reviewed and the reader is referred to the original article for the very detailed case reports and discussion.

—Henry C. Falk, M.D.

The Mortality and Frequency of Large Infants in Diabetics and Prediabetics (L'Importance de la mortalité et la fréquence des gros enfants chez les diabétiques et les prédiabétiques). R. MOREAU, R. DEUIL, G. HADJISSOTIRIOU, and CL. LAPLANCHE. *Sem. hôp. Paris*, 1955, 31: 652.

THREE HUNDRED AND ELEVEN PREGNANCIES in 117 diabetics were investigated; 230 patients were prediabetics and 76 mild diabetics, of which 54 received the regular insulin therapy and 22 were put on estrogens. Five patients became diabetic during their pregnancy.

During the diabetic period, 8 of 54 pregnant women (14.7) aborted spontaneously when treated with insulin; none aborted when treated with estrogens. The fetal mortality reported by American authors for the same period was between 10 and 26 per cent, while the authors' was 22.2 per cent if insulin was used and 18.2 per cent when estrogens were administered. Neonatal death ran about 1.4 per cent; in diabetics it was reported to be between 7.1 and 18 per cent; the authors reported 11.2 per cent without estrogen therapy and none with estrogen therapy. The total mortality was about 3 to 4 per cent and increased to 13 or 14 per cent if abortions were included. In diabetics it was, respectively, from 20 to 30 per cent and from 35 to 55 per cent. The authors' findings were 48.1 per cent under insulin therapy and 18.2 per cent under estrogen therapy.

By their investigations the authors were impressed by a certain relationship between the pregnancy and the date of development of diabetic symptoms. In prediabetics, abortions occurred in 13.9 per cent; however, they occurred in 27.3 per cent when diabetes appeared within 5 years. The total mortality increased from 9.6 per cent to 18.4 per cent. A rise in neonatal deaths from 5.2 per cent to 9 per cent was noticed when diabetes occurred within 5 years. The fetal and neonatal mortality was undoubtedly increased in diabetic and prediabetic pregnancies. A higher incidence of abortions, however, was not so obvious.

The treatment did not seem to influence the size and weight of the babies. It is interesting that women in the prediabetic period will carry large and overweight babies. Some authors even emphasize that these women will develop diabetes. From their own work and from the reports of other authors the present authors feel that there is a certain correlation between the appearance of obesity during pregnancy, the birth of large babies, and occurrence of diabetes later on.

—Robert O. Verheecke, M.D.

The Causes of Fetal Mortality and Fetal Hypertrophy in Diabetics and Prediabetics (Les causes de la mortalité foetale et de l'hypertrophie foetale chez les diabétiques et les prédiabétiques). R. MOREAU, R. DEUIL, G. HADJISSOTIRIOU, and CL. LAPLANCHE. *Sem. hôp. Paris*, 1955, 31: 656.

THE AUTHORS discuss the many possible causes of fetal mortality in diabetics and prediabetics, and present

22 cases of their own. As maternal causes, diabetic acidosis, hypoglycemia and vascular changes are discussed. It is believed that vascular changes, especially of the pelvic vessels, often resulting in placental ischemia, play a major role in the hormonal imbalance. As fetal causes, hypoglycemia, macrosomia, and pulmonary atelectasis are mentioned. Fetal hypoglycemia seems to play a minor role. Experimentally induced hypoglycemia in chicken embryos resulted in a high percentage of congenital anomalies; however, since the placenta is impermeable for insulin, the authors do not believe that these investigations are of much value. Careful obstetrical management should control the mortality rate of the large fetus. Atelectasis of the newborn is difficult to control in any case.

Hormonal imbalance of the same type observed in patients with toxemia is discussed. The studies of G. V. Smith and O. W. Smith are reviewed and their experiences with estrogen treatment are discussed. They report the results of hormonal studies in 22 cases. Careful investigations were carried out in 4 cases and pregnandiol levels were determined in 18 cases. In general, the estrogen level was found to be low, and the progesterone level almost normal. Diethylstilbestrol was given in 18 cases, and ethinyl alone or with estradiol in 4 cases. Four of the 22 pregnant women lost their babies (in 1 case after a diabetic coma; in 2 cases the babies were stillborn; and in 1 case a low estrogen level persisted notwithstanding estrogen therapy). This loss of 18 per cent is certainly lower than that obtained without estrogen therapy (48 per cent).

From these studies, the authors conclude that acidosis, the vascular changes resulting in decreased placental irrigation, the duration of the presence of diabetes, and the parallel between toxemia and hormonal imbalance are the main factors. Fetal hyperglycemia and hormonal imbalance cannot be accepted as the cause of the large fetus. The cortex of the suprarenal gland, as shown by Hoet in rabbits, may have some influence. The theory of Young concerning the hypophysial somatotropin is also of interest. He believes that the STH plays a role in the protein metabolism and in the use of glucose for tissue formation in the presence of insulin. The definite answer to all problems of the diabetic and prediabetic pregnant woman has not been found. —*Robert O. Verheecke, M.D.*

LABOR AND ITS COMPLICATIONS

Childbirth by the Vaginal Route Following a Previous Cesarean Section (Il parto per via vaginale dopo pregresso taglio cesareo). A. COLACURCI. *Arch. ostet. gin.*, 1954, 59: 316.

A TOTAL of 163 women who had previously undergone cesarean section were received in the Obstetrical and Gynecological Clinic of the University of Naples, Italy, during the period from November, 1946 to October 1952. In 89 (54.6%) of these patients the section had been performed for contracted pelvis, while the remainder underwent the section for various reasons (placenta previa, toxemia, fetal distress, placental detachment, abnormal presentation, cardiac decompensation, congenital vaginal septum, uterine malformation, old primiparas, threatened uterine rupture).

In the patients with contracted pelvis the subsequent vaginal delivery was spontaneous in 14 (42.4%), forceps were used in 12 (36.3%), version was performed in 6 (18.2%), and craniotomy was necessary in 1 (3.1%).

Among the patients delivered vaginally, whose original section was performed for other reasons than contracted pelvis, the spontaneous deliveries amounted to 65 (83.6%), forceps were used in 11 (13.9%), and version was done in 3 (2.5%).

The total fetal mortality was 9 per cent; among the causes of fetal death in these instances were placental detachment, prolapse of the cord, lues, and neglected shoulder presentation. There was 1 maternal death; this was an instance of uterine rupture occurring in the home. In fact, among the 163 pregnancies there were 6 instances of rupture of the uterus (2.5% of a total of 236 parturitions following the section). Among the ruptures occurring in the hospital, there was neither maternal nor fetal mortality. These figures alone would seem to prove that uterine rupture following a previous cesarean section is not as catastrophic as uterine rupture occurring in patients who had not undergone such intervention.

From the author's personal experience and from his study of other material at his disposal and in the literature, he concludes that the best procedure, when the indications which led to the original intervention are no longer present, is to give the patient the benefit of a trial at vaginal delivery, even though she had previously undergone a cesarean section.

—*John W. Brennan, M.D.*

End Results of Breech Deliveries at Lewis Memorial Maternity Hospital: Based on a 21 Year Study. HERBERT E. SCHMITZ, CHARLES J. SMITH, and EUGENE R. CLUMPNER. *Am. J. Obst.*, 1955, 69: 984.

IN 31 YEARS at Lewis Memorial Maternity Hospital, Chicago, there were 1,544 breech births among a total of 38,962 deliveries, an incidence of 3.9 per cent.

The maternal morbidity was 8.5 per cent and the corrected maternal mortality was zero. Breech extraction, as opposed to aided or spontaneous deliveries, cause the highest puerperal morbidity and more than twice the number of postpartum hemorrhages. Mothers delivered by extraction were in labor 30 per cent longer than those with spontaneous and aided deliveries. Footlings were delivered after shorter labors than other breeches. The position of the breech had no effect upon the length of the prolonged labors.

The corrected fetal mortality was 4.12 per cent. The fetal morbidity was 2.27 per cent. The cause of the largest number of fetal deaths was cerebral hemorrhage, and the largest number of cases of fetal morbidity were of traumatic origin. Deliveries by extraction and prolonged labor both carried a much higher fetal mortality than did spontaneous and aided deliveries. The use of episiotomy was associated with less than half the fetal mortality associated with no episiotomy. General anesthesia, in contrast to regional or no anesthesia, had the lowest associated fetal morbidity; regional anesthesia had the highest mortality. Nuchal arms were associated with traumatic morbidity in 26.7 per cent of the cases. Prolapsed cords caused an 8.9 per cent fetal mortality. Higher fetal mortality and

more postpartum hemorrhages accompanied the delivery of very large infants in breech presentation.

The present management of breech presentation at Lewis Memorial Maternity Hospital is as follows:

1. Spontaneous delivery of the breech to the scapulas or umbilicus.
2. Deep ether anesthesia.
3. Close observation and full supportive measures in all normal and prolonged labors.
4. The use of a large episiotomy in all breech deliveries.
5. Forceps on the aftercoming head in all instances in which the head does not deliver easily.

—*Alan Rubin, M.D.*

Perinatal Mortality; a Clinical and Pathologic Study of Factors Affecting Perinatal Death. ÅKE KJESSLER. *Acta obst. gyn. scand.*, 1955, supp. 1.

KJESSLER'S THESIS on perinatal mortality is a study of 397 infants who died during the antepartum, intrapartum, or the first 15 postpartum days in the hospitals of Gothenberg. Of this group 361 were single infants. The total single deliveries for the same period was 12,325. Control cases for the single infants numbered 477. Each of the cases was reviewed, and the entire pediatric, obstetric, laboratory, and pathologic record was considered in making conclusions as to the most probable underlying cause of death. The charts and diagrams indicate that a rather exhaustive search was carried out.

In 130 cases the only terminal cause of death given was asphyxia, while in the other 231 cases, 396 terminal causes of death were given, the most frequent causes being congenital debility (89 cases) brain injury (87 cases), pneumonia (70 cases), congenital malformations (46 cases) and pulmonary hemorrhage (23 cases).

The underlying causes, as given, were: toxemia (92 cases), ablatio placenta (65 cases), uterine inertia and prolonged labor (54 cases), abnormal fetal position and presentation (50 cases). Rupture of the membranes early in labor was noted in 50 cases, and the combined group of malformations numbered 45 cases.

The author discusses a number of demographic factors, including the age and parity of the mother, the sex, legitimacy, birth weight, and length of gestation of the child, and the time of its death.

The book contains a number of graphs and tables as well as 11 case reports. —*James F. Donnelly, M.D.*

NEWBORN

Exchange Transfusion in Hemolytic Disease of the Newborn. WILLIAM WALKER and G. A. NELIGAN. *Brit. M. J.*, 1955, 1: 681.

THERE is no means of preventing immunization in an Rh-negative woman, or of protecting an Rh-positive fetus against the action of antibodies, once formed. Exchange transfusion, first recommended by Hart (1925), has, however, proved of great value in treating affected infants.

Exchange transfusion is a safe routine procedure and is recommended as the treatment of choice for the 60 per cent of live-born affected infants requiring treatment.

In experienced hands, exchange transfusion carries a very low operative risk, and this risk is practically confined to infants whose chance of survival would be very poor if they were treated by other means.

Premature infants have a significantly less chance of survival than mature infants, mainly because of the increased risk of kernicterus. Therefore, prematurity should be avoided whenever possible.

In areas where exchange transfusion is adopted as the treatment of choice for all infants likely to require treatment, a survival rate of 98 per cent of all live-born affected infants can be expected. Confirmation of this claim is to be found in consideration of the two years, 1952 and 1953 (Walker and Murray, 1954), during which 217 infants with hemolytic disease were born in the Newcastle hospitals: 15 were premature, 125 (58%) were treated by exchange transfusion, while 5 more (2%) required simple transfusion. Seven died, but only 4 of these deaths were regarded as due to hemolytic disease—a mortality rate of 2 per cent.

Cord Hb and bilirubin levels permit selection of practically all cases likely to require treatment. Exchange transfusion of 80 ml. per pound (176 ml. per kgm.) of body weight, within 9 hours of birth, is indicated in these cases. —*Charles Baron, M.D.*

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Adrenal Cysts. C. H. ADDERLEY, R. T. GRIME, and RAYMOND WHITEHEAD. *Brit. J. Surg.*, 1955, 42: 389.

THE AUTHORS report 4 cases of adrenal cyst—one removed at operation and 3 found at autopsy. They were able to collect 77 cases from the literature.

There are several types of adrenal cyst, the clinically important ones being the lymphatic and the hemorrhagic cysts. Most lymphatic cysts are probably lymphangiectases. Hemorrhagic cysts are said to be produced by arteritis, apoplexy, infarction, or by hemorrhagic destruction of cysts of other types, including hemangiomas.

Usually only one adrenal gland is involved. The cysts may be multiple, unilocular, or multilocular. They are rarely more than four inches in diameter.

Most adrenal cysts are asymptomatic and are found at autopsy, or at operation for other diseases. Some, however, may cause pain or produce a palpable mass and thus lead to operation. Most of the latter group are diagnosed as renal enlargements.

Symptoms, when present, are often vague, such as a feeling of heaviness or distention in the hypochondrium; the pain may be severe. Occasionally, there is sudden severe pain with nausea, vomiting, and collapse, probably due to hemorrhage into the cyst. Such episodes may be recurrent and often are followed by fever and anemia.

A plain film of the abdomen may reveal displacement of the stomach or colon by a soft tissue mass. There may be calcification in the cyst wall. Intravenous and retrograde pyelograms will show renal displacement and indicate the retroperitoneal position of the mass. The renal pelvis and calyces may be rotated or deformed by extrinsic pressure.

Since the possibility of malignancy of the kidney, adrenal glands, or adjacent tissues cannot be excluded, surgery is indicated. The lumbar approach with resection of the last rib is usually chosen, but the abdominothoracic incision with resection of the eleventh rib may be preferred. Emptying of the cyst will usually facilitate its separation from the kidney. After removal of the cyst, the kidney should be placed up into its proper position.

In one case reported in this article, hemorrhagic cysts were found in the liver as well as in the adrenal gland and it may be that the occasional coexistence of cysts in the adrenals and other organs is due to angiitis or to a developmental weakness of the vascular system.

—*Robert Paradny, M.D.*

An Instance of Extrasuprarenal Pheochromocytoma in the Mesentery (Su di un caso di feocromocitoma extrasurrenalico a sede mesenterica). ALBERTO BRODETTI, *Gior. ital. chir.*, 1954, 10: 933.

A 41 YEAR OLD MALE began to suffer, several years before he presented himself, from intense headaches which assumed the form of crises with tachycardia, a sense of constriction in the throat, tachycardia, and, at times, syncope. These attacks would occur at rather long intervals, last several hours, and then disappear completely. Later the attacks increased in intensity and frequency. For some months the patient had noted a lump in the abdomen at the level of the umbilicus, fist-sized, painless, and extremely mobile.

At physical examination the abdominal mass was found to be the size of the head of a fetus at term, filling the left abdominal cavity. It was extremely mobile transversely but only slightly mobile longitudinally. The blood pressure was 170 mm. Hg. The roentgenologic examination disclosed an abdominal tumor apparently located in the mesentery of the small intestine.

At operation the mass was found to be well delimited and located between the peritoneal coverings of the terminal portion of the mesentery. The tumor was enucleated, the portion of the mesentery and small intestine involved was excised and a latero-lateral anastomosis was performed.

The patient convalesced without incident and 6 months later he reported that his symptoms had left entirely and that he was in perfect health.

Histologic examination of the removed tumor disclosed the typical findings of a pheochromocytoma, or chromaffin cell tumor. The neoplasm did not present any typical evidence of malignancy, that is, the parenchyma was composed of cells of practically equal size and appearance and the mitoses were neither numerous or markedly atypical.

This tumor was remarkable for two reasons. The location of a pheochromocytoma has never before been reported for this particular location and this extrasuprarenal sympathicoblastoma seemed to be of the functioning variety (adrenal sympathetic syndrome). Such functioning of a extrasuprarenal pheochromocytoma is unique.

The author believes that this neoplasm arose from a nest of chromaffin cells, analogous to the organ of Zuckerkandl. Such cell-nests are scattered practically everywhere throughout the organs of the body (ovarian paraganglia, paraganglia within the intestinal walls), and, while such origin at this location has not previously been reported in the literature, nevertheless he thinks that this is the only tenable hypothesis. If the tumor had arisen from an extension of the organ of Zuckerkandl, one would expect that it would have shown some connection with the retroperitoneal tissues.

Surgery is the only therapy which promises a complete and lasting cure of the symptoms.

—*John W. Brennan, M.D.*

A New Method to Dissolve Stones of the Urinary Tract (Ein neuer Weg zur Litholyse). H. PRZEMECK. *Zschr. Urol.*, 1955, 48: 97.

THE AUTHOR claims to have succeeded in dissolving stone and preventing the recurrence of stone in a number of selected cases with a substance called rowatin, consisting of a mixture of volatile oils. The

author describes 3 cases to illustrate the use and value of rowatin.

Case 1. A. D., 27 years old, developed a staghorn stone in the right kidney after prolonged bed rest following fractures. The stone was removed in May, 1953 through a right pyelotomy, but a number of pieces were left in the upper and lower calyces. By August, 1953 pyelotomy on the left side had to be done for a large stone in the pelvis. Both stones consisted of calcium phosphate. From September to December, 1953 the patient was given daily 3 drops of rowatin. The stone shadows on the right side decreased in size.

Case 2. E. J., 64 years old, had bilateral nephrolithiasis with frequent renal colic. Roentgen films showed bilateral large renal stones. In October, 1953 a pyelotomy was done on the right side and 20 stones were extracted. The stones consisted of calcium phosphate. Because of the generally poor condition of the patient, the left side was not operated on. For the next 3 months she was given 3 drops of rowatin on a lump of sugar daily. The roentgen films in June, 1954 showed no further stones.

Case 3. I. K., 47 years old, had renal colic for one year. X-ray films showed many stones in both kidneys. Within 3 months after rowatin administration, the patient passed 15 stones. The kidney remained free of stones on a prophylactic dose of 1 to 2 drops of rowatin daily.

The author believes that rowatin is an excellent drug, that it will diminish or dissolve urinary stones, and that it is useful also to prevent the recurrence of stones. —*S. Richard Muellner, M.D.*

Contribution to the Surgery of the Kidney: Calycectomy (Aportacion a la cirugia del riñon: calicectomia). J. M. Gil-Vernet Vila. *Cir. gin. urol.*, 1954, 8: 264.

With the usual operations for removal of calyceal stone, viz., pyelolithotomy, nephrolithotomy, nephrotomy and the various types of partial nephrectomy a number of complications peculiar to the operation adopted develop. However, the conditions which produced the stone and may cause a recurrence are disregarded for the present.

Pyelotomy for the removal of stone tends in time to produce a narrowing of the pyeloureteral junction with subsequent hydronephrosis and eventual loss of the kidney. The author's impression is that this operation is seldom indicated.

Nephrotomy is indicated for stones lodged in the renal pelvis, in the coralliform and staghorn calculi. It is not indicated for stones located in the calyces.

Partial nephrectomy (heminephrectomy) is extremely mutilating, with frequent and formidable postoperative hemorrhages, urinary fistulas, cortical infections, and perinephritic abscesses, and commonly requires secondary nephrectomy.

At the urologic service of Ramón Arandes in Barcelona, Spain, they have now operated upon 12 patients with calyceal stone, using a new type of exclusive excision of the calyx which is designated a "calycectomy." In this operation, after incision of the kidney capsule over the area to be opened and its preparation for later closure with the catgut ribbon method as described by Lowsley and Bishop (Surg., Gyn. Obst., 1933, 57: 494), a curved needle is passed down to contact the stone to be removed. The needle emerges further down so as to include the area of the renal cortex to be opened. The needle draws after itself a silk suture which is then used, by means of a sawing movement, to cut through the renal parenchyma.

The calyx is opened further with the electric cutting needle, or with scissors, so as to permit removal of the stone, or stones, and then the walls of the calyx itself are removed with an electric bistoury or scissors as far as the aperture (infundibulum) of the calyx into the renal pelvis.

Following the basic technique, a nephrostomy catheter (Malecot sound) is placed in the renal pelvis, preferably by the technique recommended by A. da la Peña (*J. Urol.*, Balt., 1949, 61: 4). A flap of fatty tissue is placed between the raw walls of the nephrostomy opening and the wound is closed by the method of Lowsley and Bishop. The catheter is removed after 10 to 12 days.

A series of 6 roentgenographic reproductions in the original text show the condition of a patient before operation and at intervals thereafter for as long as 8 months. These roentgenographs show that the excised inferior (lithiasic) calyx eventually is obliterated, that the previously markedly dilated middle calyces return to normal size in the urographic image, and that the kidney parenchyma originally draining through the inferior calyx becomes neutralized, that is, all secreting stops and the lower pole of the kidney, corresponding to the excised inferior calyx, no longer shows up on the urographic film.

In these 12 patients healing was uneventful and there have been neither immediate nor later complications of any sort. —*John W. Brennan, M.D.*

Ureterocele (Ureterocele). José Pérez Campoamor. *Arch. españ. urol.*, 1954, 10: 169.

Five instances of ureterocele are reported. All of the patients were women. The first case reported was the most instructive, since the patient underwent operative correction (transurethral cystectomy with the resectoscope) and was followed up for a sufficient time after the operation to permit some conclusions as to results to be expected.

The first instance was that of a 21 year old unmarried woman who for the past 6 months had been suffering intermittent attacks of hematuria. Independently of these attacks the patient had noted some pain episodes, not very intense, of colicky character and located in the left lumbar region. There were no attacks of dysuria and urination was of normal frequency. The urinary examination disclosed an intense, microscopic hematuria.

The cystoscopic examination disclosed only a slight congestion in the region of the right ureteral orifice and a cherry-sized rectocele in the region of the left orifice. The cystlike prominence exhibited the typical expansion and contraction coincidental with the ureteral peristalsis; the ureteral orifice was punctiform and located on the summit of the sac. There was some dilatation of the terminal ureter also on the right side but it was very small. The orifice was plain-

ly visible on the summit of the protrusion and indigo carmine was eliminated with normal time and rhythm; only its volume of emission was slightly below normal. On the left side the emission of the dye was late and in a very fine stream. Catheterization of the ureteral aperture on the right side was easily accomplished; on the left side it could be neither catheterized nor probed. The urographic examination disclosed on the left side a dilatation and atony of the ureter and the typical image of the "serpents head." On this side the renal pelvis and the superior calyx of the kidney were mildly dilated.

A transurethral resection of the ureterocele was carried out on the left side without difficulty. Cystoscopy, some days later, showed evidence of a urinary reflux into the widely gaping ureteral orifice (edema). A control cystoscopy, a month later, disclosed good elimination and clear urine, and retrograde pyelography confirmed the presence of the reflux and the presence of excellent visualization of the ureter, pelvis, and calyces. Two months later the cystoscope gave the impression that the ureteral orifice was retracting in size. The patient was followed up for several months after this and seemed to be perfectly well. In the author's opinion this postoperative course excludes the possibility of continuation of the urinary reflux.

The second instance was that of a 37 year old married woman, with 7 living children and 2 abortions, who complained of lumbar pain irradiating to the anterior and posterior regions of the thigh. Twenty-five days previously there had developed a cystitis which receded after 8 days of treatment with albucid. There were no red blood corpuscles in the urine and the frequency of urination was normal. Cystoscopic examination exhibited normal findings on the left side; on the right, however, there was a cherry-sized ureterocele, the ureteral orifice could not be visualized, and elimination of indigo carmine could not be detected. This patient died of uterine cancer before urologic surgery could be instituted.

The third instance was that of a 22 year old unmarried woman who, 2 years previously, began to suffer with mild pain in the left lumbar region, irradiating to the area of the waist and to the right lumbar and iliac regions. The pain also irradiated down along the course of the left ureter to the vulva and to both legs. There had been vomiting and febrile attacks. There was day and night frequency of urination and dysuria with the passage of white, sandlike calculi.

Cystoscopic examination disclosed ureteroceles on both sides and a large number of very small cysts (cystopathia cystica). The ureterocele was larger on the left side and exhibited the typical movements of expansion and contraction. On the left side the ureteral orifice could not be found and on the right it was filiform and could not be catheterized. Elimination of the dye was excellent on the right side; on the left, emission of the dye could not be detected. The left ureterocele was excised and the patient was discharged, free of all symptoms.

The fourth instance was that of a 23 year old unmarried woman who began to suffer, 2 months, previously, from mild pains in the left lumbar region. The cystoscopic examination revealed only a mild edema of the trigone and tiny cystic dilatations in the region of the ureteral orifices. The right orifice appeared to be normal; the left, was punctiform. The cystic dilatation on the left side exhibited expansion and retraction in the typical manner. This patient will return from time to time for occasional control cystoscopies.

The fifth instance was uncovered by roentgenography. The patient would not agree to cystoscopy and, since she did not admit of any appreciable symptoms, she was advised to return for control examinations; however, she has not returned.

—*John W. Brennan, M.D.*

Observations on Healing of Ureteral Muscle; Relationship to Intubated Ureterotomy. JACK LAPIDES and ELDON L. CAFFERY. *J. Urol.*, Balt., 1955, 73: 47.

THE PROBLEM of regeneration of ureteral muscle was reinvestigated in an attempt to determine factors involved in the failure of an operation, the Davis type of ureterotomy. The study was divided into three parts.

In the first part, 20 dogs underwent nephrectomy and the removal of a segment of ureter measuring 20 mm. in length and 4 mm. in width, about 2 cm. from the proximal end of the ureter. The portions of the ureter above and below the resected areas were in continuity with each other through the remaining segment whose width was usually about one-third of the original circumference. The ureter was intubated with a hollow No. 18 gauge polythene tube for a distance of 8 cm. In 10 dogs the intubated ureter was replaced in its original retroperitoneal position without any further procedure; in the other 10 animals the intubated ureters were wrapped first in retroperitoneal fat and then replaced. A Penrose drain was left inlying in the retroperitoneal space and the wound closed. The drains were removed 4 to 5 days postoperatively. Autopsies were performed upon the animals at desired postoperative intervals.

Microscopic examination of the ureters revealed complete regeneration of the mucosa by the end of the third week. The defects in the ureter were not bridged by smooth muscle until the sixth postoperative week. Most of the ureters which had been intubated for 6 weeks or more demonstrated a small amount of residual fibrous tissue in the muscle and serosal layers. It was noted that the intubated ureters not covered with fat were angulated and rigidly fixed to the underlying psoas muscle by dense fibrous adhesions. These findings were not present when the intubated ureters had been enclosed in fat.

In part two, a segment of ureter 20 by 4 mm. was resected in the manner described in 6 dogs, but nephrectomy was not performed. Urinary drainage of the kidney and intubation of the ureter were accomplished with the use of one hollow No. 18 gauge polythene tube which extended 7 cm. below the distal end of the resected portion of the ureter and out through the skin. The combination nephrostomy-intubation polythene tube was then placed in position in the ureter and kidney, and the ureter enclosed in fat. A Penrose drain was placed in the retroperitoneal space. After 6 weeks the polythene tubing was removed. The dogs were autopsied at intervals ranging from 6 weeks to 3 months following removal of the tubing.

In 1 dog the splinting tube was removed 2 weeks postoperatively by the animal. This dog was autopsied 6 weeks later. In this group of animals the ureters were found to be entirely patent and the resected portion almost completely bridged by muscle in animals that had been intubated for 6 weeks. All of the kidneys on the side operated on demonstrated varying degrees of pyelonephritis but no hydronephrosis, with the exception of the animal whose tube was removed in 2 weeks. At autopsy this dog's ureter was completely stenosed at the site of resection and a tremendous hydroureter and a hydronephrosis were present above the area of stricture.

In part three, 2 animals were used. The kidney and upper half of the ureter were exposed and a piece of cellophane was wrapped around the ureter for a distance of 20 mm. At 6 weeks the dogs were reoperated upon and observation disclosed (in both dogs) stricture of the ureter at the site of the cellophane wrapping with hydroureter and hydronephrosis above. The cellophane was removed and the strictured portion incised in a longitudinal manner. A No. 18 gauge polythene tube was placed in position through the kidney and ureter for purposes of intubation and urinary diversion; the ureter was enclosed in retroperitoneal fat. The tube was removed 6 weeks after operation. The dogs were followed for a period of 2 more months and then sacrificed. Gross examination at necropsy disclosed a normal caliber of the ureter throughout in both dogs. The hydroureter and hydronephrosis had disappeared. Microscopic examination of the incised portion of the ureteral stricture disclosed complete encirclement with muscle.

From these studies the authors believe that ureteral smooth muscle regenerates to a marked degree and that there is a reformation of a patent lumen with the use of the Davis intubation technique. The experimental findings indicate that periureteral fibrosis is the most important factor in the failure of the Davis procedure. This complication can be avoided partially by enclosing the incised portion of the ureter in retroperitoneal fat and by preventing prolonged leakage of urine into the operative area. The experimental data indicate that 6 weeks are required for complete enclosure of the ureter by muscle although only 3 weeks are necessary for regeneration of the mucosal layer. It is probable that the shorter periods of intubation will suffice for smaller ureteral defects. It is believed that the splinting tube should be of as large a caliber as can be accommodated by the normal portion of the ureter. —*Robert O. Beadles, M.D.*

Diseases of the Ureteral Stump. Frederick A. Bennetts, J. Freeman Crane, Jay J. Crane, Glen H. Gummess, and Hoyt B. Miles. *J. Urol.*, Balt., 1955, 73: 238.

The attention of urologists is invited to the recognition of existing disease in the ureteral stump subsequent to nephrectomy. In the normal ureter and in the hydroureter or pyoureter with free drainage of the stump, there is noticeable atrophy of the muscular coat. In the obstructed ureter, the muscular coats remain hypertrophic. Under these conditions ureteral contractions have been observed by studies on ureteral electromyography. Implications indicate that the ureteral stump is subject to the same physiological activity as the intact ureter, capable of peristalsis, hyperperistalsis, and ureteral colic.

The incidence of disease in the ureteral stump is not accurately known. One group of authors, in reviewing a series of 22 nephrectomized patients, found disease of the ureteral stump in 5 instances. The conclusions which may be drawn from other writings, however, imply that the condition is less common.

Disease of the stump may develop many years after nephrectomy. By far the most common cause of infection is an obstructing lesion of the lower ureter, such as calculus or stenosis; reflux with an incompetent ureterovesical valve is a less frequent cause.

The authors describe 4 of their own cases, 2 o which are examples of pyoureter secondary to obstruction from calculus and stenosis; the third case was that of an infected hydroureter with reflux in healed tuberculosis; and the fourth was a primary transitional cell carcinoma of the ureter occurring 27 years after nephrectomy, the second case of primary carcinoma of the ureteral stump to be recorded.

The indications for concomitant ureterectomy were listed by Fagerstrom in 1939, as follows: (1) hydroureteronephrosis and pyoureteronephrosis, particularly when stricture or dilatation of the ureterovesical junction is present; (2) calculi in the ureter when drainage is in doubt; (3) renal and ureteral tuberculosis with ureteral stricture or gaping ureteral orifice.

Urologic study of all nephrectomized patients should include investigation of the ureteral stump if it is present. —*Allan K. Swersie, M.D.*

Plastic Operations on the Ureter (Zur Harnleiterplastik). W. Knipper. *Zschr. Urol.*, 1955, 48: 83.

Diversion of the urinary stream in dysfunctions of the lower urinary tract presents a number of difficulties. Most operative procedures to divert the urinary stream have either relied on the implantation of the ureter into the sigmoid, or the ureters were implanted into a portion of the bowel which had been separated from the rest of the bowel to form a so-called "bowel bladder." The bowel bladder reduces the danger of ascending renal infection only if small intestine is utilized to form the new receptacle. When a bowel bladder is constructed, it is usually drained through an artificial fistula. This type of operation has been utilized primarily when the bladder had to be excluded.

Obstructions of the lower third of the ureter are managed differently today. The preferred method is ureterocystoneostomy if the kidney has retained good function. This will be successful if the bladder and lower portion of the ureter can be sufficiently mobilized for easy approximation and if enough of a ureteral stump is available for implantation into the bladder. If the ureteral stenosis is higher up in the ureter, nephrectomy is the operation of choice, unless the kidney is necessary for the preservation of life.

If the kidney cannot be removed and sufficient ureteral length is not available for implantation into the bladder, the author utilized a different procedure. He separated a 20 cm. section of ileum with its mesentery about 30 cm. from the ileocecal valve. The con-

tinuity of the ileum was re-established through a side-to-side anastomosis and the free portion of the bowel with its separate mesentery was then attached to the bladder. The ureter was implanted into this section of the ileum. In this manner the kidney could be saved and a ureteral cutaneous fistula or the implantation of the ureter into the large bowel could be avoided. One year later the patient still appeared to be in good condition, the kidney functioned well, and there was no reflux of the contents of the bladder into the ureter. —*S. Richard Muellner, M.D.*

BLADDER, URETHRA, AND PENIS

Experience with Implantation of Radon Seeds for Bladder Tumors: Comparison of Results with Other Forms of Treatment. JOHN L. EMMETT and JAMES R. WINTERRINGER. *J. Urol.*, Balt., 1955, 73: 502.

THE PRESENT STATUS of the treatment of bladder tumors (benign papilloma—papillary tumors grade 1, Broders—excluded) has been appraised by a summary of current literature.

The 5 year survival rates for partial and total cystectomy appear to be approximately 30 per cent. Partial cystectomy appears to give results superior to those of total cystectomy. Degree of infiltration of the wall of the bladder is the most important factor in prognosis, with the microscopic grading of degree of malignancy next in importance.

The results of transurethral and radiation therapy are difficult to compare with those of total and partial cystectomy because tumors cannot be accurately "measured" and "classified" without surgical exploration. Only by this latter procedure can degree of infiltration and presence or absence of metastasis be accurately determined. In spite of this difficulty of establishing a base line for tumors not operated upon, the literature suggests that, for the present at least, the results of transurethral removal of tumors are probably superior to those of open operative procedures.

A study was made at the Mayo Clinic of 118 cases in which radon seeds were implanted for bladder tumor. As nearly as could be determined, the tumors in these cases were of comparable "severity" or "lethal potential" to those treated by total or partial cystectomy in the Mayo Clinic series reported by McDonald and Thompson (1948). The incidence of infiltration was less than in Jewett's series of cases. In three-fourths of the cases the radon was implanted cystoscopically. In approximately three-fourths, some type of partial removal or fulguration of the tumor (either cystoscopically or suprapubically) was carried out in addition to the implantation of radon. In slightly more than half of the cases, some x-ray therapy also was given, although in most cases only a low palliative dose was administered.

The authors were surprised with the results of this radon treatment. Although 46 per cent of patients did not survive the first year, 29 per cent of 115 who were traced survived 5 years or more, which is approximately the same percentage of 5-year survival reported for total and partial cystectomy by McDonald and Thompson (1948). In the large majority of cases, recurrences or the presence of uncontrolled tumor became apparent within the first 2 years (most within the first year). A patient surviving 2 years without recurrence has an excellent chance to survive 5 years or more. Postradiation cystitis was not a troublesome complication in this group of cases. Patients who survived 5 years or more appeared to be comfortable and well "controlled" as far as bladder function was concerned.

As a result of this study, the authors are inclined to believe, as do Barnes, Turner, and Bergman, that the combined treatment of transurethral removal plus implantation of radon seeds may merit more frequent use than it has been accorded in the past.

Considerations with Reference to an Extremely Rare Mesenchymal Tumor of the Bladder: Angioreticulosarcoma (Considerazioni su un rarissimo tumore mesenchimale della vescica: l'angioreticolosarcoma). G. DELAINI. *Arch. ital. urol.*, 1954, 27: 410.

THE PATIENT was a 48 year old housewife who, 7 months previously, had begun to suffer from a moderate degree of burning at the urinary meatus immediately after urination. Two months previously bleeding from the meatus and urinary difficulties from clots occurred, followed by severe pains of the lancinating type which irradiated toward the pubic region. These pains were accompanied by a sensation of coldness in the urinary bladder. During the past 2 months the patient had lost a great deal of weight and became easily exhausted. The only finding on physical examination was the sensation of a soft elastic mass upon palpation of the left half of the bladder region. Cystoscopy disclosed an infiltrating neoplasm of vegetative aspect, occupying the left half of the bladder and bleeding easily on contact.

Diagnosis of a malignant infiltrative, vegetating vesical neoplasm was made and at operation the entire bladder was removed with implantation of the ureters into the sigmoid by the Coffey II method.

The patient healed per primam with little evidence of disturbance on the part of the ureters (there was a mild dilatation of the left ureter). However, 6 months later, the patient returned with roentgenologic evidence of pulmonary metastases. Two days later death occurred. No autopsy was procured.

The histologic diagnosis on study of the removed bladder was angioreticulosarcoma.

The author shows that the new growth satisfies all the criteria of a mesenchymal origin as established by Doormaghtigh (*C. rend. Soc. biol.*, 1925, 92: 457) up to the present time. He thinks that it is impossible in this instance to determine the mesenchymal element from which the tumor developed; however, he maintains that the question loses its importance when one considers the potentialities of extension of any mesenchymal tissue in various directions under impetus of the most various stimuli. In the case here presented the stimulus was evidently of a neoplastic nature; however, it would be useless to speculate at what stage of development the neoplastic stimulus was applied. The involvement of the urinary bladder by this type of tumor is apparently an extremely rare occurrence; in fact, in the literature available to the author the only other report was that of A. Camera (*Arch. ital. anat. pat.*, 1952, 25: 139).

—*John W. Brennan, M.D.*

Conservative Versus Radical Treatment of Bladder Tumors. ROGER W. BARNES, HENRY L. HADLEY, R. THEODORE BERGMAN, and ROD TURNER. *Med. J. Australia*, 1955, 1: 197.

THIS is a study of the office files on 251 cases of bladder tumor after a 5 year or longer follow-up.

The results of treatment largely are dependent on the tumor pathology, the criteria of which are the degree of malignancy as determined by cell structure and extent of tumor invasion. Broder's classification of degree of malignancy by grades is used. These are determined by the percentage of abnormal to normal cell structures and cell arrangement. All papillomas were included as grade I malignancy. Extent of invasion was determined by cystoscopic examination at the time of the study, and it is considered that, although not completely accurate, this method had no more than a 10 per cent margin of error. Letters are used to classify the extent of invasion: A, invasion of the mucosa and submucosa, only; B, invasion into, but not through, the bladder muscle; C, invasion through the bladder muscle to an extent which does not preclude excision; and D, extensive involvement permitting only palliation. Correlation was found between the grade of malignancy and the extent of invasion, grades 1 and 2 lesions having less extension than grades 3 and 4.

The author feels that the simplest and most accurate means of evaluating the success of treatment is by studying the time of survival following treatment. Likewise, this is a better method of evaluating the efficacy of treatment, than by the recurrence of tumor, especially since in most cases the tumors recur after treatment.

A table comparing the results from four leading sources reveals a 5 year survival rate in all types of treatment for all grades and invasions of tumor. The lowest reported was 17 per cent and the highest 33.24 per cent. Grade 1 transitional cell carcinoma is not included. It is estimated that 10 per cent of all untreated patients will survive 5 years.

Nine tables are presented to evaluate various types of treatments in all grades of bladder tumor in this series. Two tables indicating other authors' results are presented as well as two tables which illustrate other authors' results after ureterosigmoidostomy.

Conclusions are drawn from the observations that conservative treatment is preferable for early bladder carcinoma and that cystectomy does not cure the disease when it is far advanced. Creevy's observations in 1953 are mentioned, wherein the survival rate after ureterosigmoidostomy alone, in the absence of cancer, is slightly better than the rate after conservative treatment. Under conservative treatment are included segmental resection of anterior wall tumors, transvesical resection with fulguration of a tumor too large to be taken out transurethrally and not located on the anterior wall, and transurethral resection (the preferred method), although all methods including cystectomy are sometimes indicated. The use of radon seeds after transurethral resection does not increase the survival rate. Careful follow-up examination and endoscopic destruction of recurrences are essential to obtain the best results.

—*Edward J. Frishwasser, M.D.*

Urethral Plastics in Hypospadias, Urethral Defects, Stenosis, and Fistulas (Harnroehrenplastiken bei Hypospadien, Defekten, Stenosen, und Fisteln). HEINZ GELBKE. *Zschr. Urol.*, 1955, 48: 65.

THE DENIS-BROWNE OPERATION for the relief of hypospadias has received considerable recognition. This procedure has so simplified the reconstruction of the urethra that the major problem now is the thorough elimination of the chordee and the excision of the rudiment of the corpus spongiosum. A simple horizontal incision over the chordee which is later closed vertically permits only inadequate access to the area of fibrosis. Such an incision may be sufficient for mild hypospadias but is utterly inadequate for a perineal, scrotal, or penile hypospadias. Unless the fibrotic area is thoroughly excised, a poor functional result will be inevitable.

The Denis-Browne principle is also useful in large urethral defects. In 1 case the defect resulted from a war injury and repeated futile attempts to cure it. A Denis-Browne operation, however, led to a successful final result.

This operation, and especially its modification by Johanson of Sweden, can be utilized when there are dense strictures of the urethra which do not yield to instrumental dilatation. The first step of the operation consists in converting the strictured area into a hypospadiaslike state. This is most easily carried out in strictures of the perineal and penile urethra. The stricture is incised in its entire length. The penile skin is stitched to the lateral cut edges of the split urethra. If a urethra as such cannot be demonstrated, the skin edges are joined in the midline. The second step of the operation consists of a standard Denis-Browne procedure.

For the closure of urethral fistulas the author has used a simple and rather ingenious technique. The edges of the fistula are first circumcised and approximated in such a way that by means of traction on a U-shaped piece of wire, which had previously been passed through the urethra and out of the fistulous opening, the edges of the fistula are drawn inward toward the urethra. An indwelling catheter is not used and the operative area is kept dry either by a temporary suprapubic cystotomy or by a perineal urethrostomy.

A similar operation was used in a 6-year-old boy who developed a urethrorectal fistula following an accident. The fistulous opening appeared just above the rectal sphincter. Three previous attempts to close this fistula were unsuccessful and the perineum became very much scarred. The technique used by the author led to (FIG. 5a-e) successful closure of this fistula. —*S. Richard Muellner, M.D.*

GENITAL ORGANS

Treatment of Prostatic Obstruction by Means of Transurethral Endoscopic Surgery (Tratamiento de la obstruccion prostatica por medio de la cirugia endoscopica transuretral). LUIS H. RODRÍGUEZ DÍAZ *Urologia*, Treviso, 1954, 21: 543.

THE AUTHOR, Associate Professor of Urology at the urologic clinic of the Central University of Caracas, Venezuela, has been performing total, or near-total,

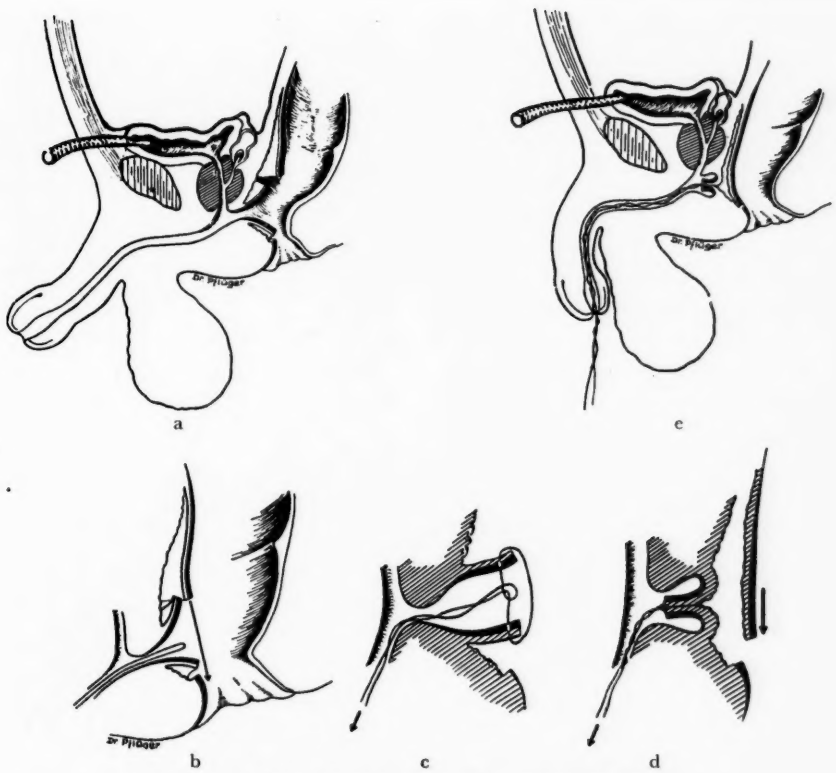

FIG. 1. (Gelbke). Successful closure of a urethrorectal fistula.

prostatectomies with a Nesbit resectoscope. The unique advantage of this instrument is that it can be manipulated with one hand, leaving the other hand free for rectal palpation during the operation. The palpating rectal finger enables the operator to estimate the amount of prostatic tissue to be removed and, by pushing the posterior capsule forwards, renders such tissue much easier to reach. No such nicety of manipulation is possible when an assistant exercises the rectal manipulations.

The author claims the following advantages for his method. There is practically no postoperative pain; there is little or no infection; there is no suprapubic or perineal wound to drain. The patient remains bedfast only one day and then is up and walking about for the remainder of the period of convalescence. The patient begins to urinate spontaneously on the third postoperative day and leaves the hospital on the seventh or eighth day.

In citing the above advantages, the author has in mind the classic open prostatectomies (suprapubic, retropubic, perineal). There are other advantages, especially with reference to the incomplete prostatectomy in which the total transurethral prostatectomy, when properly performed, surpasses all other types of operation on this organ. When properly executed the transurethral total prostatectomy exhibits little operative or postoperative bleeding and there is no residuum of coagulated and bloodless tissues to produce the long and wearisome attacks of postoperative hemorrhage, infection, and dysuria of the incomplete operation.

Most of the complications or disadvantages incident to the operation of complete transurethral prostatectomy are those pertaining to improper technique. The operation is not something which the beginner can perform with impunity; the attainment of the proper operative skill requires a long period of apprenticeship in a urologic clinic dedicated to this type of surgery. The only real limitation to the method is the size of the prostatic mass, and this only because the larger the prostatic adenoma, the more the time required for its removal; the author lays down the rule that the adenoma which would require more than an hour for its removal by this method had better be removed by suprapubic enucleation.

The author states that recurrences are no more common after transurethral resection than after any other type of operation which leaves behind the capsule of the adenoma. The capsule is merely the remains of the prostate which has been compressed into

the surrounding layer of fibrous tissue. The capsule may retain remnants of the prostatic gland which have the possibility of reproducing the original adenoma.

Another conditional limitation of the method is in those instances in which the urethra, particularly the anterior urethra, either does not tolerate the instrumentation, or the resectoscope cannot be passed without endangering the integrity of the urethral lumen (burns, lacerations, infections). In these instances it might be preferable to operate through a perineal urethrotomy; the opening thus produced heals within a few days and is never followed by stenosis or fistula.

—*John W. Brennan, M.D.*

The Present Status of Transvesical Prostatic Adenomectomy. R. J. SILVERTON. *Med. J. Australia*, 1955, 1: 210.

THIS is a study of 100 consecutive transvesical prostatic adenomectomies performed between September, 1950 and March, 1954. The author prefers the term "adenomectomy" to "prostatectomy" unless the total prostate is removed. Likewise, the term "transvesical" is used instead of "suprapubic," "prevesical" instead of "retropubic," and "endoscopic" instead of "transurethral." Prevesical and perineal adenomectomy are not discussed.

The great advantage of open enucleation is the permanence of its good effect in almost all cases. The only types of recurrent obstruction seen were carcinoma developing in the true prostate, usually after 10 to 15 years, and vesical calculus recurrence, usually associated with infection and fibrosis at the internal meatus.

The author thinks that development of carcinoma in the gland is rare and that fibrosis is preventable if infection is eliminated.

Finger enucleation is perfectly adequate. The important thing is to manage cases well enough so that mortality is at the low level achieved by skilled resectionists with the endoscope. This apparently is being done at present. Therefore indications for resection should be restricted to carcinoma, median bars, small fibrotic prostates, and diseases of the internal sphincter.

With regard to morbidity, early and late, most observers agree that this is one of the major difficulties of resection; the immediate disasters come from doing too much at one point, and the late disappointments from doing too little at various points.

After beginning resections 21 years ago, the author went to the point of treating 90 per cent of obstructions by this method. Since then, the percentage has fallen to 40 per cent in favor of the surer benefit of open enucleation for the younger group of prostatic patients who are better risks.

Mechanically, enucleability is the criterion for adenomectomy. The larger the adenoma, the more adenomectomy is indicated. With small adenomas, resection is ideal if it effects total removal. Otherwise, to avoid late recurrence, enucleation should be done.

One stage adenomectomy is contraindicated when there is great operative risk. The choice is then between two stage adenomectomy and resection. In risky cases with smaller growths, resection should be chosen. In the removal of larger growths in which the two stage adenomectomy is risky, resection in two stages is indicated. This should be done through a bulbous urethrotomy to make a long difficult operation easier. Carcinoma definitely belongs to resection as do median bars and diseases of the internal sphincter such as fibrosis, hypertrophy, and hypertonicity.

The age incidence in both series was predominantly between 60 and 79, most of the patients being in the seventies. In enucleation urethral catheter drainage was used before surgery to improve renal efficiency in 13 cases and to mitigate infection in 5 cases. Drainage periods varied from 7 to 20 days. Suprapubic cystostomy was established for the same reasons in 16 cases and the duration of drainage varied from 6 to 12 weeks. In resection, drainage by urethral catheter was done in 12 cases from 7 days to 2 months, and cystostomy was performed in 3 cases with drainage from 3 weeks to 7 months.

Mortality after enucleation was 3 per cent, and 2.8 per cent after resection.

The following are some of the complications which were encountered: vesical calculi, renal calculi, vesical diverticulum, vesical papilloma, and vesical carcinoma. No stricture of the urethra or osteitis pubis was seen following either procedure.

The conclusions drawn are that transvesical prostatic adenomectomy is equal to retropubic adenomectomy as regards mortality, and it has less morbidity. The basis for this comparison is the result of this series and an analysis of a paper by Arthur Jacobs (Retropubic Prostatectomy; Review of 500 Cases. *Lancet*, 1951, 1: 1088). —*Edward J. Frishwasser, M.D.*

Perineal Biopsy Combined with Radical Retropubic Prostatectomy for Early Carcinoma of the Prostate. HAROLD P. MCDONALD, WILBORN E. UPCHURCH, and CLINTON E. STURDEVANT. *J. Urol.*, Balt., 1955, 73: 575.

THE AUTHORS present a series of 17 patients with carcinoma of the prostate in whom perineal exploration and biopsy were carried out 3 to 5 days prior to retropubic prostatectomy. The criteria for radical prostatectomy are: (1) histologic confirmation of cancer, (2) absence of local spread on rectal examination, (3) absence of distant metastases or elevation of serum acid phosphatase, and (4) satisfactory general condition. After listing the advantages and disadvantages of perineal and retropubic operations for radical prostatectomy, they conclude that fewer complications occur with the retropubic method.

In order to obtain adequate histologic confirmation of cancer, the open perineal biopsy is carried out, at which time the prostate is freed from its posterior attachments to the rectum. A biopsy of the suspected area is taken with an electrosurgical loop cautery. Experience with frozen sections has led the authors to distrust this examination and they prefer to wait for paraffin sections. They have found that subsequent retropubic prostatectomy is greatly simplified by the previous dissection posterior to the prostate, and that the most adequate radical resection can be performed.

Of the 17 patients subjected to this procedure, 3 are living and free of disease 5 to 6 years postoperatively; 9 are well after from 2 months to 4 years; 4 died of prostatic carcinoma after an average interval of 23 months, and 1 died of pulmonary embolism 7 days postoperatively. —*C. Barber Mueller, M.D.*

Total Retropubic Prostatectomy (Die totale retropubische Prostatektomie). JIRÍ HRDLIČKA. *Zschr. Urol.*, 1955, 48: 16.

THE PURPOSE of this report is to describe the technique of retropubic prostatectomy which is a relatively simple procedure. The retropubic space is exposed through a vertical incision. The bladder is emptied by means of a catheter and the catheter is left indwelling. Under visual or digital guidance the puboprostatic ligaments are sectioned. This permits upward displacement of the prostate and urethra. Next the middle and the two lateral branches of the dorsal penile vein are ligated. The prostate is then loosened from its environment by means of digital dissection. The urethra is sectioned at the apex of the prostate. The prostate is grasped with a clamp and dislocated upward. The Denonvilliers' fascia is peeled off by gauze dissection. Veins encountered during this dissection are clamped and ligated. The dorsal and lateral mobilization of the gland is continued upward to the posterior wall of the bladder and seminal vesicles. Denonvilliers' fascia is sectioned at this point transversely, and the bladder base is freed further. The seminal vesicles are now mobilized and the vasa are sectioned and ligated. The margin between the prostate and bladder is determined by palpation, and at this point the vesical neck is sectioned. The prostate and the seminal vesicles are thus removed en masse.

The next step is to unite the urethra with the bladder base. The catheter is now reintroduced into the urethra. A small boomerang needle is used to place the approximating sutures. If the opening at the bladder base is too large it can be diminished by means of transverse catgut stitches. A Foley balloon catheter is helpful in the approximation of the bladder and the urethra. If the membranous urethra can be spared in this operation, urinary continence will be maintained.

This operation has been performed by the author in 6 cases, in 5 of which cancer of the prostate gland could be demonstrated histologically. In one case this was not possible. Two patients have now survived 5 years. The operation was usually undertaken if the rectal examination of the prostate suggested prostatic cancer which was not too far advanced. Additional tests, however, were included, such as punch biopsy and acid phosphatase determination. The author prefers retropubic prostatectomy to radical perineal prostatectomy because it is simpler and easier to perform and because complications, such as incontinence, urinary fistulas, or impotence, are avoided. He thinks that in early cases of prostatic cancer, a total retropubic prostatectomy associated with castration and hormone therapy is the best method of management.

—*S. Richard Muellner, M.D.*

Classification of Tumors of Testis; a Clinical and Pathological Study Based on 105 Primary and 13 Secondary Cases in Adults, and 3 Primary and 4 Secondary Cases in Children. M. M. MELICOW. *J. Urol.*, Balt., 1955, 73: 547.

THE AUTHOR presents a classification of testicular tumors which is based upon the assumption that the majority of tumors arise from the component elements and can be originally classified into germinal and nongerminal tumors. The germinal tumors are divided into two subgroups, because of a different response to the carcinogenic influences. If the germ cells retain their trigerminal (endoderm, ectoderm, and mesoderm) potential and maintain their original appearance a seminoma results, but if, in addition, the carcinogenic influence also causes a release or loss of the trigerminal potential a chain of events, likened to the development of an embryo, is set off, and the resultant tumors are embryomatous and teratomatous tumors. The embryonal carcinomas and teratocarcinomas are the most frequently observed tumors of this group. It is pointed out that the behavior pattern of seminomas tends to progress from a differentiated to an anaplastic type, while the embryonal tumors originally look anaplastic and then tend to become differentiated as growth and metastases occur.

The results of observation of 108 primary tumors and 17 secondary testicular tumors are presented. Of these, 101 were of germinal origin, and half of these were of the seminoma group. Of the patients who could be followed for 5 years, the survival rates were: seminoma, 25 of 33; embryonal carcinoma, 8 of 15; teratocarcinoma, 3 of 7; and adult teratoma, 3 of 3.

The author's experience in dealing with each type of tumor, its natural history, and the results of surgical or radiologic therapy are discussed. The tapping of a seminoma with a needle, as well as direct trauma, appears to disseminate the disease. The problem of tumor originating in undescended testicles is mentioned and it is believed that the rate of occurrence is much higher than in normally positioned gonads. Testicular biopsy should be done before operation for undescended testicle, and, if atrophy is present, orchectomy should be performed; the optimum time for orchiopexy is between the ages of 5 and 7 years.

The author classifies tumors of the testis as follows:

Primary

A. Germinal
   1. Pure seminoma
   2. Embryomatous and teratomatous tumors
      Embryomatous:
      a. Embryoma
      b. Choriocarcinoma
      c. Embryonal carcinoma
      Teratomatous:
      a. Teratocarcinoma
      b. Adult teratoma
   3. Combinations of 1 and 2, and of the subgroups of 2

B. Nongerminal
   1. Interstitial cell tumors
   2. Sertoli cell tumors
   3. Tumors of rete testis
   4. Miscellaneous tumors—androblastoma, gynandroblastoma, granulosa-cell tumor, unclassifiable tumors
   5. Tumors of testicular stroma

Secondary

A. Lymphomas, plasmacytomas, leucemic and lymphocytic infiltrations

B. Carcinomatosis with involvement of testis.

This is an excellent survey and classification of testicular tumors. Each variety of tumor is discussed in relation to its cell or origin, the subsequent growth, and its relation to other tumors. Survival rates in a

group of 100 cases, subdivided into other groups, have limited statistical meaning, but are used in this study to relate one tumor to another without complete dependence upon the microscopic features alone.

—*C. Barber Mueller, M.D.*

Tumors of the Cryptorchidic Testis (Tumori del testicolo criptorchide). MANLIO CAUCCI. *Arch. ital. chir.*, 1955, 79: 3.

THE FIRST CASE reported was that of a 25 year old man, who, up to 5 months previously, had enjoyed a normal sexual life, without disturbance of any kind. At this time the patient began to suffer from asthenia, anorexia, frequent headaches, and an aversion for physical activity. A tumefaction in the left lower abdomen led to the suspicion of tumor of the undescended left testis.

Operation disclosed a tumor, the size of a duck egg, replacing the left intra-abdominal testis. The tumor was successfully removed; the patient died two and a half years later. The histologic diagnosis was that of seminoma.

The second case reported was that of a 45 year old man who, 2 months previously, had noted a moderate enlargement of the right inguinal gland. This tumefaction was painless. More recently, on physical exertion, the mass began to increase rapidly in volume and the patient noted paresthesia in the skin overlying the mass and in the region of the base of the scrotum.

Operation disclosed a right inguinal testis, the size of a hen's egg, lying in the inferior third of the inguinal canal. The tumor, a seminoma, was successfully removed and 4 years later the patient was still living and in excellent health.

The experience gained in these 2 cases and the review of the literature leads to the following conclusions: any tumefaction of the testis of painless, progressively increasing character is apt to be a tumor and should lead to prompt extirpation of the mass. The author does not agree with the authors who assert that prophylaxis of testicular tumor demands that every cryptorchidic organ should be removed. Such a procedure may be justifiable in the patient of adult years with an organ that no longer promises much from operative replacement in the scrotum. In the prepuberal patient, however, an attempt must be made to bring the testis down so as to favor normal development. Especially in the instances of bilateral cryptorchidism, condemning the young boy to a life of eunuchism is unthinkable.

—*John W. Brennan, M.D.*

MISCELLANEOUS

Traumatic Avulsion of the Bladder Neck and Prostate Complicating Fractures of the Pelvis. LAZARUS A. ORKIN. *Am. J. Surg.*, 1955, 89: 840.

SEVERE CRUSHING INJURIES to the pelvis with separation of the symphysis, fractures of the pubic rami, and dislocation of the pelvic girdle are frequently complicated with total severance of the prostatic and membranous urethra. The avulsion of the urethra results in dislocation of the apex of the prostate and disruption of the bladder neck, which are accentuated by hematoma formation and urine extravasation.

The dynamics of these lesions are clear if the anatomic relations are considered. The membranous urethra, firmly attached to the urogenital diaphragm allows very little displacement at the level of the triangular ligament where the attachment of the apex of the prostate is negligible. At this point, the urethra is vulnerable to displacement of the triangular ligament and to tears of the pelvic diaphragm. This segment is unprotected against stretching forces transmitted through the ligamentous moorings of the urethra and bladder and created by sudden displacement of the fragmenting bony pelvis.

The diagnosis is suspected in the presence of shock, blood at the external meatus, urinary retention, and difficult catheterization. It is confirmed when rectal examination reveals abnormal anatomical relations such as extreme mobility of the prostate gland, or the presence of a hematoma.

These injuries require early treatment if stricture, infection, fistulas, and sinus tract and other late complications are to be avoided. The author reviews the difficulties encountered in the management of these cases and outlines the therapeutic program successfully applied in 3 patients. The follow-up studies extending over 2 and 3 year periods failed to reveal urologic complications in all 3 cases.

The principles emphasized in this therapeutic program include:

1. Adequate urinary diversion, best achieved by suprapubic cystostomy.
2. Re-establishment of alignment and contour of the urethra, best obtained by correction of the displacement of the vesical neck and prostate.
3. Prevention of undue elongation of the posterior urethra, best obtained when a perineal exit is provided to allow proper drainage of the extravasated urine and blood.

The technical details of immediate operation and the postoperative care required to achieve anatomical and functional recovery are carefully described.

—*Néstor S. Martinez, M.D.*

Comparative Studies and Deductions with Reference to the Results of Medical Therapy in a Group of Patients with Tuberculosis of the Urinary Passages (Studio comparativo e deduzioni sui risultati della terapia medica in un gruppo di tubercolosi della vie urinarie). E. P. BERTI RIBOLI, R. SALMONI, and G. M. SCARSI. *Urologia*, Treviso, 1954, 21: 647.

THE AUTHORS, working under the leadership of Giorgio Nicolich at the Urologic Division of the Civil Hospital of Genoa, Italy, have been using the medical antitubercular modalities, streptomycin, para-aminosalicylic acid, TB 1/698, and isonicotinic hydrazide in urologic tuberculosis. Seven case histories are appended with roentgenological illustrations. These 7 patients compose a group wherein especially favorable results were obtained and are part of a total material of 82 completely studied instances of tuberculosis of the urinary tract; that is, they were all initially positive to the guinea pig test of the urine for the bacillus of Koch.

These 82 patients were all that were considered suitable for medical treatment in a total material of 218 patients with urinary tuberculosis; the remainder

were almost all subjected to nephrectomy without preliminary medical treatment.

The results show that, in the year period, 2 of the patients with the best results (complete disappearance of both objective symptoms—Koch's bacillus in the urine—and subjective symptoms) had suffered a recurrence (Koch's bacilli reappeared in the urine) and the results are therefore considered as merely good. These recurrences occurred in the group of 15 cases of unilateral renal tuberculosis.

The other change in the year's results occurred in the 7 cases of bilateral renal tuberculosis (early cases), in which the original good result became optimum.

The results in the 16 cases of tuberculosis of the remaining kidney, and in the 4 cases of cystitis tuberculosa did not exhibit any change.

On the whole, the authors are rather optimistic with regard to the medical treatment of the initial forms of unilateral open tuberculosis with minimal or absent pyelographic signs of tubercular involvement. On the other hand, in the more advanced stages with evident pyelographic signs of the disease, the results have not been encouraging. This is true especially in the instances of bilateral renal tuberculosis, in which only 1 instance among 7 in the authors were able to induce the disappearance of all clinical signs of the affection. In 3 other cases there was a certain amelioration, particularly of the subjective symptoms; in these instances it is probable that the medical cure put a check on the progress of the malady.

The medical cure proved efficacious in the cases of cystitis tuberculosa, even in the periods of recurrent involvement of the upper reaches of the urinary tract. It failed to effect a cure of the bladder condition only in inveterate cases with irreversible lesions (lesions penetrating through the bladder mucosa and those with marked sclerotic lesions).

Resistance to the antibiotics was rarely encountered, even in the cases in which treatment was resumed after interruption. The antibiotic combination considered most efficacious was that of streptomycin and para-aminosalicylic acid.

The authors are also of the opinion that results from this combination are still further improved when treatment with Chaulmoogra oil is given. In instances of intolerance to the para-aminosalicylic acid, or instances in which the first cited combination becomes exhausted in its effects, the streptomycin may be advantageously associated with hydrazide or TB 1/698 (thiosemicarbazone).

None of these drugs seem to be effective without streptomycin, with the exception of hydrazide (hydrazide of nicotinic acid), which may be administered alone when the patient is intolerant to streptomycin. —*John W. Brennan, M.D.*

Some Uses of an Isolated Loop of Ileum in Genitourinary Surgery. L. N. PYRAH and F. P. RAPER. *Brit. J. Surg.*, 1955, 42: 337.

THE LOWER ILEUM is suitable anatomically and physiologically for incorporation into the urinary tract. It has an excellent blood supply and its mesentery is long enough to allow the ileum to lie without tension in the pelvis. Enzyme secretion is slight. A considerable quantity of mucus is produced and occasionally has caused obstruction when the ileum has been incorporated into the urinary tract. Periodic alkalinization of the urine may prevent the accumulation of masses of mucus. Experimental and chemical investigations carried out with a loop of ileum used to transport urine reveal that there may be a tendency for potassium, urea, and chloride to be reabsorbed from the urine in such a loop. There may, also, be produced an acidosis due to excessive loss of sodium, but this may only be temporary. Most reports in the literature leave the impression that chemical imbalance is much less common following operations incorporating ileum into the urinary tract than when both ureters have been transplanted to the functioning colon.

The literature on the subject is reviewed in detail. Operations that have been performed to enlarge the bladder (ileocystoplasty) are described from the earliest (performed around the turn of the century), to those performed recently. Reports of various operations that have been used to replace one or both ureters by ileum are noted. The literature on the use of ileum as a urinary reservoir is briefly reviewed.

The method of preparation of an ileal loop is clearly described together with the preoperative preparation employed by the authors.

Thirteen cases are reported, in which an isolated loop of lower ileum is used to enlarge a contracted bladder, to relieve a contracted bladder and a hydronephrosis of a solitary kidney, to reanastomose ureters previously transplanted into the colon to the bladder, to replace part of a ureter excised for neoplasm, and to act as an artificial bladder. These case reports are very lucidly described and are accompanied by adequate drawings and diagrams, as well as very satisfactory postoperative cystograms and intravenous pyelograms. Excellent postoperative results are described.

An ileal loop may be used to enlarge the bladder in one of the following ways: (1) ileocystoplasty with a closed loop; (2) ileocystoplasty with an open loop. The closed loop may be used to enlarge any contracted bladder which is free from infection. A loop of ileum is prepared and both ends are closed. An anastomosis is then carried out between the posterior wall of the contracted bladder and the center of the loop of ileum. The peritoneum is sutured to the intestine to bring the anastomosis outside the peritoneal cavity.

The authors have employed the closed loop ileocystoplasty in 4 cases with excellent results. Three of the patients had interstitial cystitis and 1 had a contracted bladder following tuberculosis. Ileocystoplasty with an open loop is used to enlarge any form of contracted bladder and to enlarge the bladder immediately after a large partial cystectomy. The loop is prepared but both ends are left open and it is completely divided along the antimesenteric border. Bleeding points are ligated. One case is described in which the patient was treated in such a manner for a carcinoma close to the bladder neck. Unfortunately the patient died of a pulmonary embolus on the fourteenth day.

An ileal loop may also be used to reimplant the ureters into the bladder after injuries to the ureters, or if the ureters have previously been diverted to the skin or colon as a temporary measure. To reimplant one ureter, a short length of ileum may be used to replace the necessary segment. To reimplant both ureters, a loop of ileum in the form of a U may be used, a ureter being implanted into each of the limbs and the center of the U being anastomosed to the bladder. The authors performed one such operation on a woman who had had a bilateral ureterocolic anastomosis for a large vesicovaginal fistula, and who developed recurrent attacks of pyelonephritis. The fistula was closed, following which the ureters were implanted into a loop of ileum and the loop was anastomosed to the bladder, as described. The patient made an excellent recovery and the urine became sterile and free from pus.

An ileal loop may also be used to enlarge a contracted bladder and to relieve, at the same time, an associated hydronephrosis of a remaining kidney resulting from ureteral stricture, reflex, or spasm of the systolic bladder. The authors performed one such ureteroileocystoplasty, which was followed by good results.

Ileum may be used to replace the ureter in instances of injury or stricture, and also after resection of a portion of the ureter for tumor of the ureter. It is best to excise all of the ureter from the point of disease down to and including the ureteric orifice and to replace it with a sufficiently long loop of ileum. The authors resected three ureters for primary ureteric tumors, reconnecting the remaining portion of ureter above to the bladder by means of an intervening loop of ileum.

Ileum may also be used as an artificial bladder. The ileal loop, serving as a collecting tube for urine, emerges from the abdominal wall and a bag can be attached to it. This procedure has been used by some surgeons after total pelvic evisceration or following cystectomy. The authors have used the procedure in a case of spina bifida with urinary and fecal incontinence, and in 2 patients with long-standing ectopia vesicae with renal damage. Ureterocolic anastomosis was deemed inadvisable in the patient with urinary and fecal incontinence, and hazardous in the 2 patients with renal damage. These authors usually employ ureterocolic anastomosis following cystectomy. The technique of the operation is adequately described and illustrated. —*Robert Paradny, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Fate of Radiopaque Media Injected Into the Cancellous Bone of the Extremities. R. G. HARRISON and H. H. GOSSMAN. *J. Bone Surg.*, 1955, 37-B: 150.

THE AUTHORS report a series of experiments on 6 cadavers into which radiopaque media were injected into cancellous bone 36 to 48 hours after death. Roentgenograms were made immediately after each injection, and the filling of the venous pattern was noted. It was apparent that the injection of the radiopaque material into the cancellous bone resulted in the rapid appearance of the media in the venous system. With this knowledge, the authors were able to trace the venous drainage pattern of the upper part of the humerus, the elbow, the distal part of the radius, the proximal part of the tibia, the proximal part of the femur, and the knee joint.

The authors point to the ease of introduction of the material into the cancellous bone as one means of easily transfusing blood, or as a method of phlebography in the presence of edematous extremities.

—*E. W. Johnson, Jr., M.D.*

Means and Indications for the Physicotherapeutic Management in Instances of Posttraumatic Rigidity (Mezzi ed indicazioni di terapia fisica nella rigidità post-traumatica). DANTE COSTANZO and CORRADO DE RUGGIERO. *Ortop. traumat. app. motore*, 1954, 22: 653.

AT THE UNIVERSITY OF ROME, in Italy, the service of Carlo Marino-Zuco has been investigating the benefits to be derived from the various physicotherapeutic procedures used in cases of posttraumatic joint stiffness. Two methods have been developed which seem to be new. In one there is a sort of Bier suction cup which is made in various sizes for exerting direct traction on adhesions and for producing a local hyperemia; it is used chiefly on adhesions binding the quadriceps muscle down to the underlying tissues. In the other there is a table on which the patient lies face downward, both traction and manipulation being exerted on the stiff knee. In preference to massage, the service resorts in most instances to the application of the sinusoidal current. This exerts both a trophic and an antalgic effect. None of the methods used are applied with sufficient intensity to produce an irritative effect.

The shoulder is the joint which is most sensitive to trauma; in any injury thereto the trophism of the abductor (deltoid) and external rotator (infraspinatus) muscles are the ones which must be treated. In the early phase heat and the electric (sinusoidal) current will best stimulate and preserve the trophism of these muscles. Here, however, care is necessary, because of the thinness of the muscle layers, to avoid irritation of the joint structures underneath. In the later phase massage and gymnastics may be aimed at any deficiency which may be present. A remarkable result was obtained with this therapeutic regime in an 11 year old boy.

In the elbow joint the muscles are, as a rule, involved in the rigidity only in fractures of the humeral diaphysis. Therapy should be directed in the main toward the articular complex with only a bland stimulating (sinusoidal current) of the trophic processes in the muscles. This form of treatment will generally control the tendency to antalgic contracture, so often encountered in this joint. The articular component (capsular retraction) will need thermotherapy and kinesitherapy.

In the wrist joint the tendency to stiffness in such conditions as the classical Colles fracture is best combated by heat and kinesitherapy, supplemented by the analgesic action of the sinusoidal current. Such treatment is particularly efficacious when the patient is taught to treat himself.

In the hip joint the susceptibility to trauma in the sense as mentioned is lowest; however, when rigidity does develop it is apt to be quite persistent. In most instances the stiffness is apt to arise from something in the joint itself and to require surgical treatment. The limitation of motion is usually in the nature of a hindrance to interno-external rotation and to ab-adduction which will at least partly be benefited by passive and active kinesitherapy.

In the knee joint the fractures of the femur are apt to result more frequently in rigidity since here the immobilization in the cast is longer than in fractures of the leg bones. In the injuries of the knee joint itself the treatment is very likely to be surgical. In the supracondylar fractures the formation of adhesions between the muscles and the bone is apt to be extensive and stubborn. Here, in addition to the modalities discussed, much further benefit may be derived from more vigorous measures, such as the suction cup treatment, massage (including kneading), and forced breaking up of adhesions under narcosis. Such results were obtained in the case of a young man with a severe open fracture of the femoral diaphysis, and in the case of a young woman with comminuted supracondylar fracture with involvement of the intercondyloid region of the knee joint.

In the fractures about the ankle joint, ambulation is apt to be seriously hindered; the hindrance is apt to be of a nature to require surgical treatment; however, the tendons leading from the leg to the foot may become involved, either by the injury itself or during the period of immobilization, and this can be benefited by physicotherapeutic methods. In addition to such symptoms there frequently develops an edema about the ankle joint which may be benefited by massage and vacuum therapy. When the reduction of mobility resides in the intrinsic muscles of the foot, a peculiar advantage is derived by massage preceded by heat therapy.

There are, of course, many other details in the treatment on a physiologic basis which have been worked out and proved experimentally at the Uni-

versity of Rome; however, the examples chosen for this report are considered to represent the most important modalities of physicotherapeutics as applied to the most important joints involved in the usual cases of traumatic surgery. It is thought that the publication of these results will help place the application of physicotherapy of these conditions on a rational basis.

—John W. Brennan, M.D.

Para-Articular Posttraumatic Ossification: O. P. P. (Ossificazioni pararticolari post-traumatiche: O.P.P.). A. PELLEGRINI. *Chir. org. movim.*, 1954, 40: 362.

THIS PATIENT, a 36 year old male whose case history was originally published in *Clin. Mod.*, Florence, 1905, 11:433 fell from a height of about 2 meters, striking the medial surface of the left knee against an iron bucket. The bruising and swelling gradually improved, yet after a period of some months the patient still walked with somewhat of a limp and the tumefaction on the medial aspect of the left knee had become osseous in consistency, fixed, and of the size of a pigeon's egg. The nodule was elongated in a longitudinal direction and extended, both upwards and downwards, to lie beyond the level of the interarticular line.

The roentgenographic and histologic pictures (Figures 1, 2, and 3 in the original text) disclosed an osseous formation confined to the area of the tibial collateral ligament of the left knee. Following removal of the osseous nodule the patient regained full use of the left lower extremity.

Microscopic section of the specimen disclosed an ossification, 30 mm. in length, confined to the central portion of the tibial collateral ligament and surrounded on all sides by normal-appearing ligamentous tissue. The mass was composed of two portions—an upper more densely ossified section, partially adherent to the medial condyle of the femur, and a lower section of which the shadows appeared less dense and completely separated from both the upper section and from the femoral condyle.

The author concludes that the upper section may have spread from an injury to the periosteum of the medial femoral condyle (osteoblastic migration) but that the lower section was evidently a process of osseous metaplasia within the tissues of the ligament and entirely independent of any bone injury.

The author re-publishes this case history as a completion of the publication (*Chir. org. movim.*, 1931, 16:3), and to establish his priority once again, since the original article published in 1905 is no longer available.

In 1907 Stieda reported 6 cases of traumatic ossification of the knee and the condition became known as Stieda's fracture. Stieda assumed the existence of a fracture in all these instances; however, it has since become established that fracture is not always present, and some authors have asserted that trauma is not necessary. Later, the condition became known as Pellegrini-Stieda disease. The author, however, believes that since the condition described by Stieda was essentially a fracture of the medial femoral condyle, the condition described herein should be designated the disease of Pellegrini, or better, perhaps, the Pellegrini syndrome.

The most important problem today is that of prevention of the condition. The author cites the voluminous statistics with reference to joint traumas, compiled by the Rizzoli Institute, Florence, Italy, combined with those of the Institute of Codivilla-Putti of Cortina d'Ampezzo, Italy. These figures indicate that in no instance in which the knee was immobilized following trauma has there developed any evidence of ossification.

—John W. Brennan, M.D.

Muscle Recovery in Poliomyelitis. W. J. W. SHARRARD. *J. Bone Surg.*, 1955, 37-B: 63.

THE PROBLEM of predicting the degree or rate of muscle recovery in poliomyelitis is an important one, and one upon which major considerations of treatment hinge. The author has very closely analyzed the condition of 142 patients with poliomyelitis over a 3 year period, and in the process of this study has observed recovery of the muscles in 3,033 lower extremities and 1,905 upper extremities. The intent of this period of observation was to form an opinion of the potential ability of any given muscle to recover, if once its power was measured by an accepted method of muscle testing. For purposes of this article the author devised his own method of muscle testing, which is a slight modification of the method proposed by the Medical Research Council of Great Britain.

The rate of recovery in muscles of the lower extremities followed a fairly set pattern, provided those muscles permanently paralyzed were excluded. Starting out at a high initial figure, the rate of recovery falls steadily until, at the twelfth month, less than 5 per cent of the muscles show any further recovery. No increase in strength was seen after the twenty-fourth month, except in rare instances. The most interesting finding was that all the muscles of the lower limb showed almost identical rates of recovery.

When the same analysis was done on muscles of the upper extremity, similar findings were noted except that the rate of recovery in these muscles was roughly 5 per cent higher per month than in muscles of the lower limb.

These rates of recovery were projected against the age of the individual patient, and it was seen that the muscles of those of the older group progressed with less speed than did the muscles of those in the youngest, with muscles of patients in the middle-age ranges showing a rate of recovery falling between these two extremes. This observation was constant also in the infants, even though they were unable to co-operate in the treatment.

The author believes that the uniform rate of recovery in either limb is such as to make prediction of the final strength of any given muscle possible. Thus, the author has perfected a formula by which eventual strength may be calculated if 1 month or more has elapsed since the acute phase of the disease. These formulas vary only slightly for the lower or upper limb. Also, 90 per cent of muscles completely paralyzed at 6 months will remain completely paralyzed.

In all the muscles tested, only three muscles showed permanent deterioration of power. In each instance an especially powerful antagonist was the cause.

—E. W. Johnson, Jr., M.D.

Considerations with Reference to the Histopathology of Posttraumatic Stiffness of the Knee Joint (Considerazioni sull'istopatologia delle rigidita posttraumatiche del ginocchio). VINCENZO MARINO. *Orlop. traumat. app. motore*, 1954, 22: 591.

WITH THE AID OF numerous biopsy specimens at the Orthopedic and Traumatologic Clinic of the University of Rome, the author reports his findings in a histopathologic study of posttraumatic stiffness of the knee joint. A series of color reproductions of the histologic findings, with legends in Italian, French, English and German, documents the textual descriptions.

This work more or less parallels that of Weigl (Zschr. Orthop., 1951, 80: 395) on this subject. The author did not find in his material the so-called pannus, formed of young connective tissue of highly vascular character, which the German scholar depicted as spreading over the cartilaginous joint surfaces. Although the author was able to detect in his material the extensive changes in the plane of mobility, that is, that plane in which the various tissue layers tend to glide on one another, he was not able to demonstrate the confluence of these connective tissue strands to form extensive cicatricial masses (plastrons). Although the author's cases evidenced atrophic and hyperplastic connective tissue changes in the muscles, chiefly the vastus intermedius and the tensor fasciae femoris, no genuine giant cells were present, unless one considers as giant cells the larval cellular elements incident to irregular attempts on the part of the muscle to regenerate muscle fibers (myoblastic syncytial cells).

Another manner in which the author's material differed from that of Weigl consists in the lack of direct relationship between the histopathologic picture of the suprapatellar bursa and the degree of limitation of articular mobility. The author finds that the chief factor in the rigidity of the knee joint in this condition is of a periarticular character, consisting substantially in the sclerotic changes and degenerative manifestations of the connective tissues which occupy the plane of mobility within the muscles and about the joint. This plane is made up of the virtual spaces interposed normally between the anterior face of the femoral diaphysis and the vastus intermedius. Lower down this plane encompasses the whole of the joint capsule and separates this structure from the musculotendinous formations in its proximity. It is normally formed of areolar connective tissue and contains within itself the prolongation upwards of the synovial sac beneath the tendon of the quadriceps muscle.

The author considers that the symptom of rigidity of the knee joint is not the result of one but of a number of factors. He believes it is not possible to draw valid conclusions with reference to matters of prognosis and treatment from the histologic examination alone. —*John W. Brennan, M.D.*

The Cure of Tuberculosis of the Knee by Wide Exposure (Freibeweglich ausgeheilte Knie-Tuberkulosen). JOHANNES SCHLAAFF. *Zschr. Orthop.*, 1955, 85: 599.

THE AUTHOR stated that 25 years ago he performed an arthrotomy of a knee joint affected with tuberculosis and allowed it to be aired for several minutes, after observing a similar procedure for tuberculous peritonitis. The best results were obtained when the exudative phase of tuberculous peritonitis had reached its peak and before adhesions had developed.

The author performed 176 arthrotomies in which he opened the knee joint widely, allowing it to be "aired." There was not one case of secondary infection, nor was there one instance of generalized tuberculous infection or meningitis. It is noteworthy that 30 per cent of all of the cases diagnosed as tuberculosis proved not to be tuberculosis at all. A U-shaped incision was made and the extensor apparatus was lifted away from the joint. The joint was allowed to remain open for 20 minutes. Even though the operation itself had no curative effect, by draining the exudate the circulation was restored and toxins were removed. The concomitant atrophy of the muscles was eliminated.

The author pointed out that the reason a "cure" was obtained in all cases of tuberculosis of the knee joint was that he followed the recommendations meticulously. No instrument was allowed to touch the skin before it entered the joint itself, and instruments that had been used in the joint were resterilized before being used again. Inasmuch as the postoperative cultures of the exudate were positive in only 50 per cent of the cases, the author excised small portions of the synovia in 4 to 6 different positions. He paid particular attention to the synovial patellar ligament. In cases of tuberculosis this ligament was thickened to a considerable degree. He believed that the guinea pig inoculation test is not a very reliable one. It was usually assumed that tuberculosis of the synovial membrane required 5 to 7 years to be completely cured, and a joint that had full range of motion most likely never was tuberculous. The author carried out the "airing" operation on the infected knee joints in 176 cases. There were 90 cases of proved tuberculosis; 40 per cent had functionally satisfactory results and 10 per cent showed good results. The postoperative treatment lasted from 6 to 24 months.

It is not wise to do the same operation in the hip joint because the structure of the joint does not permit this type of operation to be satisfactory. The same holds true for the elbows and wrists; however, the shoulder would be a satisfactory joint for use of the "airing" operation. The author states that he has never seen a case of true synovial tuberculosis of the shoulder joint. He treated 52 patients with tuberculosis of the shoulder, but all of them presented abscess formation and sinuses. —*George I. Reiss, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Bone Homograft from Osteogenic Exostosis (Ostéoplastie du tibia par greffe d'une exostose ostéogénique). R. CAMERA. *Acta orthop. belg.*, 1954, 20: 521.

THE AUTHOR reports the case of a 62 year old patient with an ununited fracture of the right tibia, of 6 months' duration. It proved to be a pathologic fracture, the primary process being a giant cell tumor.

A curettage of the neoplasm was carried out and the resulting defect was filled with material from a voluminous femoral exostosis from a healthy 18 year old

a b c

Fig 1. (Lenggenhager). a, Pericapsular exostoses 3 years after operation. b, Immediately after the operation. c, Three years later with downward gliding of the prosthesis and impingement of the neck on the upper acetabular margin.

man operated upon simultaneously in the same department.

A coincidence in the surgical schedule provided an unusual type of homograft which was extremely successful in this case. Roentgenographic examination in a 14 week follow-up showed good union of the graft. Weight-bearing was allowed on the limb which had been operated upon but a cane was advised. Further examinations at 5 and 18 months postoperatively were completely satisfactory from both clinical and roentgenographic standpoints. —*Fernando Aleu, M.D.*

Treatment of Tuberculous Coxitis at the Heidelberg-Schlierbach Orthopedic Clinic (Die Behandlung der Coxitis tuberculosa an der orthopaedischen Klinik Heidelberg-Schlierbach). S. WEIL and R. FRÜND. *Chirurg*, 1955, 26: 49.

THE AUTHOR discusses the high incidence of tuberculous coxitis in the clinic, which is second only to tuberculous spondylitis. It represents 24 per cent of all tuberculous affections of the bones. The time of first appearance of disease as recognized on roentgenograms is from 2 or 3 years on the average after dissemination. Complete restitution is rare and when spontaneous ankylosis occurs encapsulated foci and malposition of the extremity should be watched for. Because of prolonged treatment many types of complications may occur. Biopsy in many doubtful cases was used successfully. Conservative treatment was used in early cases and consisted of bed rest, spica cast, diet, and systemic and local injections of antituberculous drugs. In chronic stages early arthrodesis was found to be most advantageous. Since iliofemoral arthrodesis in the authors' series was successful in only 42 per cent of the cases, ischiofemoral arthrodesis was used. Of 32 cases 80 per cent were graded as excellent. The youngest patient was 8 years old.

The advantages of early surgery were early ambulation, a stabile hip, and improvement of the general resistance. The same method was used in fibrous ankylosed painful hips. The other extremity was equalized when possible by epiphyseodesis. Recently the author has attempted to remove larger foci surgically, which were recognized on tomograms and were well circumscribed. Most of them were located in the acetabulum and in the head of the femur. The defects after removal of the lesions were filled with tuberculostatic medicine. The results are at present too early to evaluate. In the authors' opinion arthrodesis of the hip is a safe and successful procedure which shortens considerably the course of the disease and leads to early healing. —*George Wichman, M.D.*

Surgical Principles in the Treatment of Coxarthrosis; the Femoral Head Sleeve Prosthesis (Grundsätzliches zur operativen Behandlung der Coxarthrose; die Huelsenkopfprothese). K. LENGGENHAGER. *Helvet. chir. acta*, 1954, 21: 372.

THE AUTHOR states that the Smith-Petersen vitallium nail was abandoned because of poor results in the form of redislocation and marginal osteophytes. He also objects to the prostheses of Judet for the following reasons: (1) the stem of the prosthesis causes obliteration of the important cervical vessels, followed by pressure necrosis of the neck region, and (2) danger of downward slipping of the femoral head by gravity, which is illustrated by a case in which the prosthesis, pushing against the upper acetabular margin, caused marked osteophyte formation (Fig. 1).

The new Judet modification with a more horizontal neck basis is also not considered reliable. This Judet modification offers advantages but does not form a medial base sufficiently large to counteract pressure, especially in the semiflexed position. In addition, the author objects to the danger of vascular impairment by the stem of the prosthesis. The acrylic head prostheses of Merle D'Aubigne and Gosset show similar biologic disadvantages, especially on weight bearing in flexion. The introduction of a nonresilient acetabulum (Maatz) does not offer any advantages.

Therefore, the author offers a new prosthesis consisting of a sleeve which forms a cuff around the stump. This ensures a wider support, similar to the crown over a tooth, instead of a pin which does not withstand as much pressure and bending. The pressure is evenly distributed and pressure damage is avoided later on. A possible loosening or displacement is evidently eliminated by multiple holes in the prosthesis through which new vessels and tissue creep. The prosthesis is hammered distally to contact with the greater trochanter to ensure a wide supporting base. The akryl material offers sufficient strength, but the new models in 4 sizes are made of vitallium. For the surgical approach the Ollier incision with temporary detachment of the greater trochanter is recommended to avoid loss of muscle power (gluteus medius and minimus), as is noticed with the Smith-Petersen approach. For after treatment Kirschner extension (4 to 6 kgm.), gradually decreasing within 4 to 6 weeks to allow for functional adaptation, is recommended. Passive exercises are started immediately. Ambulation with 2 canes is permitted after 8 to 10 weeks. In addition, the patient's shoes are fitted with thick inner and outer rubber soles to compensate for the loss of cartilage. A number of roentgenograms in the original article demonstrate the advantages of this method. —*Ernest H. Bettmann, M.D.*

The Functional Results of Arthroereisis (Les résultats fonctionnels des arthrorises). CH. DE RACKER. *Acta orthop. belg.*, 1955, 21: supp. 1.

THE AUTHOR has made an extensive study of the use of arthroereising procedures for the ankle, knee, and

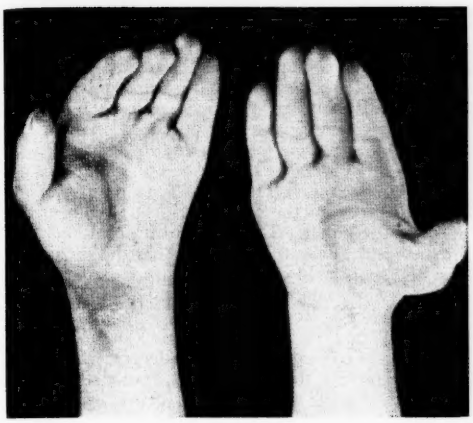

FIG. 1a (Giordani)

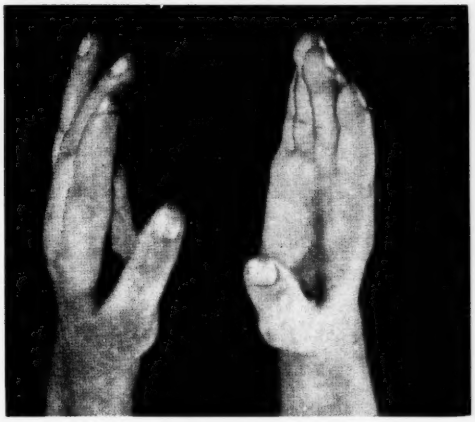

FIG. 1b (Giordani)

elbow joints. The main indications for the use of these procedures are flaccid or spastic paralyses.

In the ankle joint anterior, posterior, and combined anterior and posterior arthroereises are possible. Motion of the ankle may be limited in three ways: (a) by an extra-articular bone-block; (b) by an intra-articular block altering the joint surfaces; and (c) by a plastic resection of the tarsal bones (Lambrinudi).

In some cases of spastic paralysis, a posterior arthroereisis by a bone-blocking procedure has been successful in securing permanent correction and in diminishing the spasticity. In the treatment of flaccid paralysis, a posterior arthroereisis is generally used in combination with arthrodesing procedures of the foot, or with tendon transfers. A long term follow-up, however, proved that the results were not always lasting, especially in flail feet. Lambrinudi's operation exposes the patient to the likelihood of ankle instability, but it is the procedure that is used in the majority of cases today.

Anterior arthroereisis, combined or not with tendon transfers, is used by some surgeons in the cases of flail legs and paralytic pes calcaneus, to stabilize the foot in equinus position. For correction of the valgus and varus deformity at a very young age, the author mentions Ombredanne's procedure of inserting a bone peg through the subastragaloid joint, the protruding end of the peg at the posterior surface of the ankle joint acting as a bone block. However this free portion of the peg seems to be absorbed frequently.

According to Steindler, Whitman's astragalectomy acts as a combined anterior and posterior arthrodesis, and is a very useful procedure in pes calcaneocavus and calcaneovalgus in children.

The main indication for arthroereisis of the knee joint is the paralytic genu recurvatum. The functional results are better in instances in which a procedure combined with hamstring transfers can be carried out, since this transfer removes the deforming factor. However, even in patients with extensive paralysis it has been possible, by arthroereisis of the knee joint, to correct the deformity, and secure stability without the need for braces. The best technique seems to be the extra-articular lifting of the tibial plateau (Irwin).

Arthroereisis of the elbow joint is useful in transfers for flexor paralysis. —*Joseph C. Mulier, M.D.*

ORTHOPEDICS IN GENERAL

Clinical Contribution to the Subject of the Malformation of the Thumb Fixed in Flexion and Adduction (Contributo clinico allo studio del pollice flesso addotto). C. GIORDANI. *Chir. org. movim.*, 1954, 40: 513.

TWO INSTANCES of this congenital anomaly are reported. Neither of the patients afforded a history of hereditary stigma in the family.

The first case reported was that of a 6-year-old boy. In both the right and left hands the thumb was strongly adducted and flexed into the palm of the hand. A short incision was made over the metacarpophalangeal joint of the right thumb and the tendons of the extensor pollicis longus and the abductor longus were exposed. These were both tenuous, not much thicker than a string of catgut. Another incision was placed over the lower third of the volar surface of the forearm so as to expose the tendon of the palmaris longus muscle; this tendon was cut and the end passed subcutaneously to the region of the first incision and united under appropriate tension to the first 2 tendons mentioned. A posterior capsuloplasty was done and the hand put in the corrected position in a cast. The result was quite good (FIG. 1); the patient was able to abduct the thumb and to grasp large objects.

The operation was later repeated on the left hand; however, the tendon of the extensor carpi radialis brevis was used in place of that of the palmaris longus. This operation did not prove successful and the left hand was re-operated upon; the tendon of the extensor carpi radialis brevis was detached and replaced by that of the palmaris longus, as in the operation on the right hand. Again the result was not perfect; however, there was some correction and the patient was able to grasp small objects with the left hand.

The second case reported was that of a 7-year-old boy with hand deformities of the same character as the first; however, the right hand was not badly deformed and the left hand was the only one operated upon. The operation was carried out in the same manner as in the first case reported. In this instance the result was again excellent with regard to the grasping function of the thumb; however, the abduction of the metacarpus is still impeded by the retracted condition of the soft parts between the metacarpus of the thumb and that of the index finger.

The author believes that the operation in these instances should be preceded by a period of elastic traction exercised on the retracted tissues.

—*John W. Brennan, M.D.*

Clinical and Experimental Studies with Regard to Osteoplastic Laminectomy. (Text in Japanese; Summaries in English and Japanese). HIDEKAZU FUZITA. *Arch. jap. Chir.*, 1953, 6: 643, 654.

THE FINAL RESULTS of 118 laminectomies upon patients from the orthopedic service of Eishi Kondo at the University Medical School of Kyoto, Japan are considered in this paper. Most of these operations were performed since 1941; during this period the technique has changed from the classical operation (30 cases) to the bilateral osteoplastic laminectomy (63 cases) and, finally, to the technique of unilateral laminectomy (25 cases).

After the herniated disc operations any preoperative lateral curvature of the lumbar spine was diminished or had disappeared entirely. This was also true of the anterior curvature (lordosis), and the correction was frequently followed by development of an actual posterior curvature; eventually the spine returned to the normal or near normal state.

Arthrosis deformans which developed following the intervertebral disc operations and postoperative disc flattening were not prevented by the osteoplastic type of operation. The number of instances of arthrosis increased with the passing years after operation; flattening of the intervertebral disc did not evidence any such behavior. Even the tendency of the arthrotic changes to progress ceased eventually.

Postoperative limitation of the mobility of the lumbar spine frequently developed; its rate of development corresponded roughly to the rate of development of the arthrotic manifestations. With the osteoplastic techniques such limitation was not especially evident.

The moot question in the osteoplastic laminectomies is the matter of reunion of the replaced portion of the vertebral arch at its original bed. Here is shown the advantage of the unilateral technique. The demonstration of such union roentgenologically is not too satisfactory in the human, and this explains the impetus toward a closer study of the process experimentally in dogs, a study which comprises the second communication of this series of reports.

In the bilateral osteoplastic laminectomies the fusional process arose practically only from the cortical layers of the bone, the time required for consolidation was long, and the completeness of the fusion was not as thorough as expected. Even with the bilateral technique fusion did eventually occur but did not usually take place before the tenth week and then showed intercalation of considerable areas of connective tissue or fusion by means of osteoid tissue. With the unilateral technique, fusion was fairly solid and almost completely osseous in nature after only 5 weeks.

There was evidence of slipped spine (spondylolisthesis) in 1 patient who was operated upon by the classical laminectomy method, and in 2 patients who were operated upon by the method of bilateral osteoplastic laminectomy. There was not one instance of this sequela among the 25 patients who were operated upon by the unilateral method. In trying to account for this result the author suggests that the broad surface of apposition in the unilateral method and the abundance of spongy bone in the spinous process may be considered as factors.

The author does not attempt to explain the complaints of the patients who have undergone this operation. He merely states that it is known that these sequelae occur in greater or less degree, no matter what the technique employed. He believes that they result to a certain extent from the decrease of the supporting power of the posterior portion of the vertebra. He has not found evidence of pressure on the contents of the spinal canal or on the nerve roots by excessive development of new bone.

With the object of pursuing further the interpretation of the clinical findings discussed previously, laminectomies were performed on the lumbar vertebrae of 11 dogs, and the results were studied by roentgenologic and histologic methods. Only the two osteoplastic types of operation were used.

The bilateral osteoplastic laminectomy was done on 7 animals. One of these animals was sacrificed and studied after 2 weeks, 2 after 4 weeks, and 1 animal each after 7, 8, 10, and 12 weeks. The unilateral osteoplastic laminectomy was carried out in 4 animals and the examination was made after 2 weeks in one animal, after 5 weeks in 2 animals, and after 10 weeks in 1 animal.

In every instance roentgen exposures were made and the removed lumbar vertebrae fixed in 10 per cent formalin and decalcified. The blocks to be examined were then embedded in celloidin and stained with hematoxylin-eosin.

The two operations were performed in the same manner in the dog as in the human. In the bilateral technique the laminae of the vertebral arch on both sides were osteotomized in the usual oblique direction, to leave the inferior articular process attached to the portion of the arch (the transplant) which was removed and later replaced. In the unilateral technique the spinous process was sawn through longitudinally in the midplane of the body and the usual oblique osteotomy was performed on the sides selected for the osteoplastic procedure.

In some of these animals, in order to increase the firmness of the apposition and the reliability of the immobilization of the transplant, the inferior articular process of the transplant was fastened with silk sutures to the superior articular process of the next lower vertebra.

Particularly studied were the character and rapidity of the reunion of the transplant to its osteotomy bed, the presence or absence of pressure on the con-

tents of the spinal canal by atypical osseous hyperplasia (osteophytic production) and the changes in the intervertebral articulations.

In the bilateral osteoplastic laminectomy fusion of the bone surfaces was nearly complete after 7 to 8 weeks; after 10 weeks it was complete. In the cases of unilateral osteoplastic laminectomy osseous fusion between the apposed spongy bone surfaces of the spinous process was present, and the bone marrow cavity and osseous trabeculae were in the process of formation. Between the surfaces of the osteotomized laminae there were intercalated areas of osteoid tissue, but between the greater part of these surfaces the fusion was osseous in character.

In one of the animals with bilateral laminectomy a pseudarthrosis resulted, but in this instance it is believed that the immobilization of the fragment was not firm. Here osseous replacement was delayed and the transplant was observed to have undergone a process of lacunar resorption. In the bilateral laminectomies the osseous replacement process was not complete even after 10 weeks; in the unilateral laminectomies it was complete after 10 weeks.

In the bilateral laminectomies the osseous repair was chiefly of the absorptive (the "Abbau" or osteoclastic activity of Axhausen) plus appositive ("Anbau", or osteoblastic activity of Axhausen) type. In the unilateral laminectomies the process of osseous repair resembled the "latent replacement" type of Barth and Marchand.

In a number of instances there were observed, at the level of the osteotomy, connective tissue adhesions between the dura and the wall of the spinal canal. In the instances in which the osseous fusion had been rapid and complete ahesions were not noted.

In the intervertebral articulations there were noted arthrotic changes and poor staining of the cartilage cells. —*John W. Brennan, M.D.*

Experiments with the Use of Steel Spiral Springs As a Substitution for Muscles (Esperienze di sostituzione di muscoli con molle di acciaio). M. Caucci and I. Rocca. *Chir. org. movim.*, 1954, 40: 463.

Ten dogs were used in these experiments. In all, the triceps surae muscle of the left hind leg was excised and replaced by a prosthesis consisting of a rounded spiral spring, or by a flat spiral or ribbon of steel. The rounded spirals were all of rustless steel and were applied by four different methods.

The first method consisted of simply hooking the ends of the spiral through ligamentous loops prepared from the tough tissues comprising the origin and attachment of the excised muscle. This method was used on 2 dogs. In one animal the spiral gave way after 24 days; in the other it became enmeshed in connective tissue and did not work.

The second method consisted of passing the upper hook of the spiral through a perforation in the upper third of the shaft of the tibia and then hooking it over a Kirschner wire which had previously been passed through the marrow cavity (infibulation). The lower end was fixed in the same manner as in the first method. In the 2 dogs so treated the lower attachment gave way after 15 days and one month, respectively. In both dogs the tendinous loop had given way.

The third method consisted of fastening the upper end of the spiral in the same manner as in the second method. The lower end was fastened to the tip of the cancaneal tuberosity by means of a large screw which was placed at a distally inclined angle to prevent displacement under traction. This method was used in 2 dogs. In the one animal the lower end of the spiral broke 6 months later, though functioning well in the meantime; in the other animal the spiral continued to function for 4 months, when the dog was sacrificed to procure the part for study.

The fourth method consisted of fastening the upper end of the spiral in the same manner as in the second method; the lower end was passed through a perforation through the tuberosity of the calcaneus and then hooked over a screw which was fastened into the calcaneus on its lateral aspect. This method was used in 1 dog and the prosthesis is still functioning perfectly 5 months later. The animal is able to run and leap up; but, it tires quickly when up and about.

The flat type of prosthesis, employed in the remaining 3 dogs, was not successful; the tempered steel spiral and ribbon were not tolerated by the tissues and the rustless steel ribbon became deformed.

The authors conclude from these experiences that the third and fourth methods are practicable for not too lengthy periods, and may be used to supplement paralyzed muscles and protect the joints and bones concerned from the deleterious and deforming effects of the unopposed traction and retraction of the antagonistic muscles. With these two methods the wounds heal perfectly and the spiral spring continues to function. It is necessary that the coils be closely approximated so that the sheath of the newly formed connective tissue does not intrude between the coils and block their action.

—*John W. Brennan, M.D.*

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Revascularization of the Arteriosclerotic Extremity. GEZA DE TAKATS. *Arch. Surg.*, 1955, 70: 5.

UNDER the hemodynamics of ischemia, the author describes the concept of critical closing pressure enunciated by Burton and his associates, which states that if the pressure within a small vessel falls below a certain critical value (the "critical closing pressure") it will close actively and completely. The author believes that this adds a new meaning of vasomotor tone to the concept of vascular resistance. Vascular spasm, for example, simply means that the critical closing pressure is higher than the available blood pressure. One may consider, therefore, that sympathectomy raises the critical closing pressure in vessels below the point of occlusion by reduction of vessel tone and by increasing intraluminal tension and providing more flow through collaterals. A second concept, which has been enunciated by Dornhorst and Sharpey-Schaefer, states that in ischemic limbs the collateral pathways cause increased vascular resistance which can be calculated by intra-arterial pressure measurements. Sympathectomy may cause a considerable decrease in collateral resistance both in acute and chronic occlusion. In order for collateral blood vessels to function, the head of pressure must be sufficiently maintained and the diameter of the collaterals must be as large as possible. In a sclerotic extremity relying for its viability on collaterals a sudden fall in blood pressure and/or peripheral vasoconstriction due to shock or hemorrhage may bring on a critical state of circulation with acute massive thrombosis.

Peripheral arteriosclerosis is graded in four groups, varying from the warm extremity in patients with no trophic changes with claudication after two to six blocks through the cooler extremity with absent pedal pulses, to the patient with claudication within a half block and moderate trophic changes up to the terminal phase, or grade 4, with ischemic changes in certain areas such as the toes, manifested by color changes, extreme pallor, ulceration or gangrene, and continuous rest pain.

In the first group arteriograms may reveal a short segmental stenosis of the superficial femoral or common iliac arteries. Endarteriectomy of the common iliac artery for the upper type of stenosis and resection with end-to-end suture or venous graft for a lower stenosis have been the two treatments of choice. Lumbar sympathectomy will decrease claudication.

In the second group in which the pulse is probably on the basis of collateral vessels, claudication will not be relieved by sympathectomy although cyanosis disappears and a warm foot results. Arteriograms indicate total occlusion and partial obliteration of long segments. In most of these patients the profunda femoral artery is patent. Sympathectomy is most important, but extensive resections of the obliterated segments combined with reaming out stenotic proximal and distal segments are worth trying.

In the third group in which the oscillometer does not show a swing, but there is no rest pain, the lesion is based upon a combination of closed major arterial pathways together with closure or damage of the terminal vascular bed. The direct surgery of arteriosclerosis does not seem applicable here. Sympathectomy may re-vascularize the toes, eliminate pain, and heal ulcers, but should be preceded by paravertebral sympathetic or posterior tibial block. Failure to warm the toes or a paradoxical drop in skin temperature either contraindicates sympathectomy or will have to be followed by high metatarsal amputation.

Treatment for individuals in group 4 is not available at the present time, beyond ultimate and eventual amputation.

With the availability of heparin and the experience that the denuded media, stripped of its atheromatous intima, may remain patent for months and years thrombectomy may today be successful where formerly it was not. Organization of a thrombus does not take its usual course in a vessel with a thickened hypoxic intima and for this reason thrombectomy may be considered as late as 8 to 14 days after acute occlusions. The author has limited the use of endarteriectomy to the treatment of the stenotic or occluded common iliac artery and has utilized heparinization only before and during surgery and not continued it after the operative procedure. The greatest problem in this operation is to know how far up and down the artery the operation is to be continued and how best to avoid curling up of the sectioned inner core against the lumen. The late results of endarteriectomy of the superficial femoral artery have been so poor that the author has not used it, and autogenous or homologous vein grafts are preferable. For this method to succeed a pulsatile flow of blood is essential. The aortic bifurcation, the ileofemoral segment, and the superficial femoral artery are the areas in which excision of the totally occluded segments and replacement with an autogenous or homologous graft is most successful. The requisite is the presence of a patent distal segment. The absence of color and temperature changes and particularly the absence of atrophy or shrinkage of fat pads on the toes is a good indication that the main arterial pathways distal to the obstruction are patent. The author has an aversion to the indiscriminate use of arteriograms and believes that the patency of grafts, especially in the smaller femoral segment, should not be demonstrated by postoperative arteriograms since closure of the graft may follow even after several years.

Of all the medications advocated during the past few years, the author believes that there are only a few drugs (notably heparin, procaine, priscoline, and histamine) which, when given intra-arterially above the level of an acute obstruction, really accomplish regional vasodilatation or prevent proliferation of an arterial thrombus. The author is not aware of any convincing proof that reduction of animal fat in the diet to 60 grams a day is useful, but nevertheless has used

the low fat diet for many years in the hope that it may be.

Of the methods of physical therapy, only the oscillating bed and the intermittent venous hyperemia apparatus have stayed in use although this latter is used less frequently than before because of the advent of more direct surgical measures. The author cautions that unlike vascular repair in acute injuries, the available surgical procedures today should always be weighed against the expectant progress or standstill of arteriosclerosis. —*Allan D. Callow, M.D.*

Homotransplantation of Formaldehyde Preserved Arteries in Dogs; a Fundamental Study. E. J. Moeys, F. W. Mreyen, and B. J. C. Den Hartog. *Arch. chir. Neerl.*, 1954, 6: Supp.

In this monograph from the State University of Utrecht and St. Elisabeth Hospital, Tilburg, Holland, the authors present the results of their extensive studies on the homotransplantation of formaldehyde-preserved arteries in dogs. The article contains many excellent photomicrographs. The grafts were taken under unsterile conditions within 24 hours of death of the animals. They were then placed in a 4 per cent formaldehyde solution, adjusted to *p*H 5.6 by adding acetic acid, and stored at room temperature. Twenty-four hours before transplantation the grafts were taken out of the solution and placed in sterile saline with heparin, penicillin, and streptomycin. Anastomoses were made with No. 00000 silk, using a continuous overhand suture. The grafts varied in length from 2 to 8 cm. after preservation from 21 to 176 days; they were placed in the thoracic or abdominal aorta and then studied macroscopically and microscopically after implantation from 1 day to 1,101 days. The postoperative changes in the grafts as well as in the acceptor (host) vessels are described in minute detail. The grafts were found to have excellent properties and showed only slight degeneration of the elastica.

Errors in surgical technique were responsible for thrombosis which caused complete or partial failure of grafts, and the authors suggest that the technical details must be mastered before attempting these procedures. Among the errors which promoted thrombosis were: insufficiency of sutures, infection, pressure effects of clamps, rupture of fibers and tears in the host aorta, rupture of host or graft branches, as well as the use of grafts which were too wide or too narrow.

During healing, an external tube of hyaline connective tissue developed on the implant and sutures; true foreign body reactions were noted only about the sutures. The grafts underwent necrosis, leaving the elastic reticulum which constituted the actual prosthesis. The investigators did not find a complete endothelial lining in the grafts, but normal aortas examined also had areas devoid of endothelium. The internal surface was covered by fibroblasts for a distance of 15 mm. from the suture line, and only grafts 3 cm. long or less were completely lined; larger grafts remained unlined in the central portions. This condition occurs in arteries treated by other preservative methods as well. The "prosthesis" (the elastic reticulum) was extremely resistant and showed few signs of degeneration; the authors suggest it may remain fairly intact throughout the lifespan of the host. They believe that the many variables involved in a study of this kind need further investigation, including the degree of formaldehyde concentration, the duration of preservation, acidity, temperature, composition of the arteries, including the proteins, and the use of alloplastic tubes.

—*Albert M. Schwartz, M.D.*

Limits and Dangers of Injection Therapy for Varices (Die Grenzen und Gefahren der Varizenveroedung). W. Leun and B. H. Langmaack. *Deut. med. Wschr.*, 1955, 80: 257.

The authors review the current literature on injection therapy for varicose veins. They are advocates of this method, and they state that treatment by injection has given better results than operative treatment.

The solutions used in the production of thrombosis are discussed. Sodium chloride often leads to marked local and general reactions, and necrosis of the skin develops after perivenous injection. The disadvantages of dextrose lie in the more frequent occurrence of recanalization and, where present, the enhancement of infection. Derivatives of the fatty acids (varsyl, sotradecol) are preferred by the authors, since they seldom lead to reactions and yield a good thrombus formation.

The various methods of injection therapy are not discussed. The dangers of injecting an excessive amount of solution, too fast, are emphasized. A period of 8 days should elapse between each injection.

Indications and contraindications to injection derive mainly from 3 tests: (1) the Trendelenburg test to demonstrate insufficiency of the superficial veins; (2) the Perthes test, and (3) the Mahorner-Howard-Ochsner test, both for determination of patency of the deep veins and function of the venae communicantes.

Chronic phlebitis, varicose ulcer, and eczema should be treated before injections are done, and then the first injection should be more highly diluted than usual to test the possibility of reactions. Injections during pregnancy are not recommended. Purulent infections following injections should be treated by incision and drainage, and skin necroses by *in toto* excision.

Embolus seems to be a rare complication. The authors have not observed one instance of embolism in more than 10,000 injections. Allergic reactions have also become rare and can be controlled with antihistaminic drugs.

Much benefit has been derived from some sort of an elastoplast bandage, for both preinjection and postinjection management. —*Fritz H. Moser, M.D.*

BLOOD; TRANSFUSION

Effect of Intravenous Calcium Gluconate on Posttransfusion Hypotension; Clinical Observations. Joseph G. Strawitz, John M. Howard, and Curtis P. Artz. *Arch. Surg.*, 1955, 70: 233.

Calcium lactate, which was administered intravenously in order to combat posttransfusion and postoperative hypotension resulted in a satisfactory response in the experimental animal. Calcium gluconate was given empirically on the hypothesis that a relative insufficiency in hepatic function following severe in-

jury may result in a slowing of the metabolism of citrate which is administered in large quantities, as an anticoagulant, during the course of massive transfusions. This might be associated with a reduction in the concentration of ionized calcium in the serum. A reduction in the ratio of ionized calcium to potassium concentration in the serum would be even more likely since the serum potassium not infrequently rose during the postoperative period. A reduction in cardiac output might therefore result. Since the concentration of ionized calcium in the serum cannot be measured chemically, a therapeutic test of calcium appeared as the most direct method of approach.

Four normotensive controls, 3 battle casualties, and 1 patient with obstructive jaundice were tested. Of the 4 control subjects, 2 were normal men and 2 had received minor injuries. Each was observed for 1 hour after the intravenous injection of 10 c.c. of 10 per cent calcium gluconate. One patient noted an increased sense of warmth, but there was no detectable cardiovascular response. The blood pressure and pulse rate were not altered.

Four other patients demonstrated a striking response to calcium. These were selected from a larger group as representing the patients whose response was most striking. Several others demonstrated a transient response to the injection of calcium. A greater number demonstrated no response at all. Although the effect of calcium was transient in several of these patients, and several of them died as a result of their wounds, its beneficial effect was occasionally very striking. Its effect on the blood pressure was detectable within 1 or 2 minutes after injection. One last patient was included because of pre-existing hepatic damage, and the response to calcium injection was quite marked.

Beyond the fact that several patients demonstrated a striking response, a fact which justifies further study, it was concluded that the results cannot yet be interpreted. The dose of calcium to be injected was selected arbitrarily. Continued study is necessary, but the clinical impression has been that the injection of calcium improved the cardiac function, as indicated by increased quality of the heart sounds, pulse volume, and blood pressure. —*Stephen A. Zieman, M.D.*

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

The Rate of Body Weight Loss Following Surgical Stress of Uniform Intensity. ALBERT J. PAQUIN, JR. *Ann. Surg.*, 1955, 141: 383.

THE DAILY total body weight was determined in 12 male patients undergoing radical total cystectomy with bilateral cutaneous ureterostomy. It was considered that about the same degree of surgical trauma was sustained by each patient. The patients were of the same sex, approximately the same age, were suffering from the same disease (carcinoma) of similar extent in each patient, were afebrile, and were free of hormonal or metabolic disorders.

A rapid loss in weight occurred in the immediate preoperative period when the patients were placed on a bowel preparation. The curve of the postoperative daily weight decline began on the day of surgery and ended on the day when the body weight ceased to decline. The rate of weight loss was expressed in grams per kilograms of body weight per day following surgery. The range was 2 to 6 gm./kgm. per day (average 4.1 gm.). The duration of loss was 7 to 29 days.

Since the response to surgery is thought to be due to starvation and hormonal activity, this rate was compared with rates of loss in 5 fasting patients whose cases were previously reported by Benedict. The average was 4.8 gm. per kilogram. There was an initial phase of rapid loss due to rapid depletion of glycogen stores and the loss of preformed water. This compared with the initial weight loss of the surgical patients during preoperative bowel preparation. The second phase of more gradual loss in both groups was caused by uniform destruction of body tissues.

The authors conclude that there is "a rather uniform rate of body weight loss following surgical stress of uniform intensity" and that the rate is predictable if there is no metabolic disorder.

—*Victor M. Bernhard, M.D.*

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Accidental Injuries in Preschool Children; a General Survey. F. W. CLEMENTS. *Med. J. Australia*, 1955, 1: 348.

ACCIDENTS are now the principal cause of death of children aged from 1 to 14 years in Australia. The preschool period is the most important because of the high accident rate in these years and therefore during this period the child's awareness of accident prevention should be developed.

A survey was made of nonfatal accidents in large numbers of preschool children with the questionnaire method. A small pilot study was first made to test the form of the questionnaire. The cards were sent to all kindergartens affiliated with the State Kindergarten Unions and to a selected group of infant departments in State Schools in New South Wales. Thirty-five thousand cards were sent out. Finally 23,784 cards (12,131 for boys and 11,653 for girls) were available for analysis.

A high percentage of children were recorded as having had an accident. Five important types of accident were found, namely, traffic accidents, burns and scalds, falls, poisoning, and near drowning or drowning. These five categories accounted for 70 to 85 per cent of all accidents recorded. The higher percentages were in the younger age groups. The accident rates were greater in males. Falls accounted for 35 to 51 per cent of all accidents and falls occurred with greater frequency in the older age groups.

The high rates for burns and scalds in the first 3 years of life and the relatively high frequency of deaths due to burns and scalds in this age group confirm the hazards for young children in the bathroom, kitchen, and laundry. Road accidents did not occupy a prominent place in the total pattern of accidents. Death from drowning is the most important cause of accidental death in the first 3 years of life for boys and the first 4 years of life for girls. At other ages it is exceeded only by deaths from the combined road accidents.

Further studies and analyses are in progress and will be the subject of later reports by the author.

—*Donald C. Geist, M.D.*

Early Treatment of Extensive Burns (Le traitement accéléré des grands brulés). P. COLSON, P. STAGNARA, R. HOUOT, and P. LECLERCQ. *Lyon chir.*, 1955, 50: 16.

THE CARE OF PATIENTS with deep and extensive burns remains a very difficult problem. In this article the magnitude of the problem is considered in the light of an accelerated form of local treatment. Two cases are presented which emphasize the difficulties encountered.

Aside from the technical details involved in the management of deep and extensive burns the essential therapeutic concept is the early and quick application of local measures directed to protecting the burned patient whose life is in imminent danger. Failures after careful and prolonged treatment are due to late complications. Toxemia, infection and cachexia account for more deaths than the changes which immediately follow the burn. After adequate shock therapy and supportive measures are instituted it is the clinician's duty to foresee the individual reactions to possible late complications and to prevent and combat them by early local treatment.

Prevention of infection and toxemia. The deeper the wound, the greater the danger of contamination. Infection masked by the routine use of antibiotics should always be suspected.

If early cleansing of a deep and charred wound is carried out only a few saprophytes and pathogens of low virulence are found. If débridement of the wound is delayed 4 or 5 days a deep streptococcal or anaerobic infection is found when the superficial tissues are removed.

In some industrial accidents dirt and chemicals are present in the injured skin; they should be removed promptly if pathogenic bacteria are to be eliminated.

An early débridement is a necessary step to protect the burned patient against a serious infection in the first few days and further danger in the future. Late local interventions are usually followed by hyperthermic infectious reactions and frequently by fatal septicemias, in spite of all the precautions taken.

Use of general anesthesia. In the treatment of associated lesions in the burned patient, the use of general anesthesia may be necessary. If this is not the case the indications should be individualized. Supervision of the narcosis by a qualified anesthesiologist will prevent added risk, even in patients with burns of the respiratory passages in which inhalation anesthesia is contradindicated. Among 1,200 cases no death occurred under anesthesia and later deaths were explained by the depth and extent of the thermal injury. Anesthesia does not increase the degree of shock and no patient died in shock whose fate could not be predicted by the magnitude of his burns. Anesthesia can produce a dramatic relief from pain in some burns of the hands, feet, and scalp, and help to decrease shock.

Starvation and problems of nutrition. A state of undernutrition becomes established in the first few days. Beginning insidiously and heralded by a pronounced erythrocyte and total serum protein drop, this condition can follow a progressive inexorable course until death from cachexia and fatty degeneration of the liver supervenes, usually within 3 months. Even young, sturdy patients with large appetites, tolerating overnourishment and receiving parenteral therapy, cannot escape this fate unless the course of events is modified early.

Extensive burns produce a loss of ions and proteins in concentrations similar to blood plasma. As it is essential that a positive nitrogen balance be established, transfusions are used for replacement and local treatment is employed to prevent further losses. Conservation of proteins can be achieved by local excision, early skin grafting, and even amputation, with the aim at all times of preserving the life of the patient.

During the first few weeks there is good resistance to surgical trauma. With encouragement even long operations with the associated blood loss are well tolerated by the patient.

The responsibility of the surgeon is great during the first few days. He must be aware of the inevitable consequences of infection and cachexia in order to carry out supportive measures. The life of the patient depends upon his decisions.

A 23 year old male athlete was burned while unconscious after a motorcycle accident. Deep charred wounds involved the lower half of the body from the costal margin to the toes, sparing only four small areas. When hospitalized 5 days later, the wounds were cleansed under general anesthesia, and biopsy showed complete necrosis of the epidermis, dermis, and intradermal skin appendages. In spite of refrigeration, supportive measures, and adequate replacement therapy, fever and tachycardia increased and he became delirious. The next day the thigh was amputated at the upper third; the leg was gangrenous, and complete coagulation within the veins was seen on microscopic examination. The general condition improved and the burned surfaces began to macerate. The wound was deeply scraped under general anesthesia 16 days after the accident and a staphylococcus aureus was cultured from the deep tissues. The patient became more comfortable and his general condition improved. Eleven days later multiple "postage-stamp" grafts from the arm and thorax were transplanted to the abdomen, left leg and amputation stump with a take of 90 per cent. Thirteen days later grafting was again undertaken and Steinmann's pins were passed through the femoral stump, the tibia, and the metatarsal bones of the left leg, with suspension to relieve pressure on the posterior aspect of the body. Within the next 2 months, four grafting operations were undertaken and the necrosed toes of the left foot were amputated. One month later the suspension was discontinued and the amputation stump was closed.

In the 4 month period of illness 12 liters of blood were given and 10 operations were performed, averaging almost one operation every 12 days.

In a second case the clothes of a 6 year old girl caught on fire, producing a circular burn of 50 per cent of the body surface and extending from the lower third of the thorax to the middle third of the legs. On admission 3 days later, bilateral cut-downs were performed at the ankles for transfusions. The burn was completely cleaned with a germicidal soap under general anesthesia. Two days later the necrosed tissues were removed down to the fascia of the abdomen and extremities. Since the patient's general condition was not good homografts from the mother were applied to the raw surfaces with a successful take of 90 per cent. The homografts showed evidence of progressive elimination about the seventh postoperative day. After 4 more operations 45 per cent of the patient's body surface had been grafted. The deep burns were healed in less than 3 months. The antibiotics used, with the exception of erythromycin which was employed at the end of the treatment, did not lessen the fever. Eight thousand cubic centimeters of blood were given by transfusion.

These two cases emphasize the facts that amputation reduces the burned area and that early excision and grafting prevent protein loss and should be performed regardless of the serum protein level. Small grafts which permit healing of the donor area in about 15 days provide new skin for further grafting.

—*Néstor S. Martínez, M.D.*

A Review of Burned Hands in Children. D. Wynn Williams. *Brit. J. Plast. Surg.*, 1955, 7: 313.

A review of 100 unselected cases of burned hands in children under 16 years of age at the Queen Victoria Hospital, East Grinstead, England, was undertaken to assess the cause, type of treatment, and subsequent deformities. Of these, 67 resulted from direct contact with heating appliances, 36 being caused by electric fires and 31 by coal fires. Seven cases were caused by other electric appliances and another 7 by steam. Nine miscellaneous agents caused the remaining 19 injuries. Thirty-four of the 100 patients had burned both hands, giving a total of 134 hands in this series, while

TABLE I.—LOCATIONS AND TYPES OF BURNS

	Partial Thickness	*Full Thickness*
1. Complete palm, dorsum and dorsal and volar aspects of fingers	6	12
2. Palm and volar aspect of fingers	9	36
3. Volar aspect of fingers	15	32
4. Dorsum of hand and dorsal aspect of fingers	4	10
5. Palm alone	4	2
6. Dorsum alone	2	1
7. Palm and dorsum alone	0	1

31 had associated burns elsewhere. The anatomical distribution and type of burn are shown in Table I above.

The breakdown of treatment and complications is subdivided into partial thickness and full thickness skin loss. Forty hands sustained partial thickness (second degree) burns, of which 2 were grafted. All healed in from 3 to 9 weeks. In this group, 32 hands had palmar burns, and 15 of these developed contractures. None of the dorsal partial thickness burns developed contractures.

There were 94 hands with full thickness (third degree) burns in 70 cases, half of which were treated by primary grafting and the other half were allowed to granulate. Most of the 47 grafted cases were done on or before the tenth day and 70 per cent subsequently developed contractures, most of which involved burns of the volar aspect of the distal palm and fingers; only 4 of the burns of the dorsum which were grafted developed contractures. The average time between burning and the repair of the contractures was 3.5 years. The procedures used were split skin grafts (14), Z-plasty (10), and combined (4); arthroplasty and osteotomy were performed 5 times.

The half treated without primary grafting developed contractures in 73 per cent with approximately the same distribution of dorsal and volar areas. The average time from burning to definitive surgery was 2.5 years, and the surgical procedures were almost the same as in the preceding group. Comparison of hospitalization for the two groups showed 6.5 weeks with early skin grafting as compared to 8.5 weeks without grafting.

In none of these cases was prolonged splinting used. After this study, early grafting was performed in 2 cases of palmar burns and the patients, aged 1.5 years and 2.5 years, respectively, were splinted in extension, but not hyperextension, for 3 months in one case and 5.5 months in the other, the splints being removed twice daily for washing the hand with soap and water. At the end of this prolonged splinting, both patients had a good range of flexion and extension. In considering this method of treatment, the author emphasizes that the burned hand of the child is different from that of the adult in three ways: there is no chronic edema in the child, very little to no hyperesthesia, and there is good motion in the child's hand following prolonged immobilization. The author prefers the volar acrylic splint molded to shape and fastened with a crepe bandage.

In summary, then, there is a high incidence of contracture deformities following full thickness burns of the hand, with little difference between those treated by early grafting with split skin, and those not grafted. Postepithelization splinting has been stressed for a minimum of 6 weeks, and the patient should be followed up at intervals until full growth has been attained. —*Carl Schiller, M.D.*

The Dellwood Fire. MARIAN E. COX, BARBARA F. HESLOP, J. J. KEMPTON, and R. A. RATCLIFF. *Brit. M. J.*, 1955, 1: 942.

A NARRATION of the tragedy which befell the tiny occupants in the nursery of the Dellwood Maternity Home, Reading, England, on April 18, 1954, is presented. Thirteen of the 15 newborn babies succumbed in the early morning fire. The case history and time of survival of each infant is discussed. Treatment consisted of oxygen, aspiration of mucous secretions, penicillin, streptomycin, and cortisone. Gastric oxygen was given to several babies *in extremis*. In those babies who survived the first 48 hours, percussion drainage was attempted in addition to postural drainage and frequent position change, with temporary good results.

There is a detailed presentation of the pathologic findings and the most striking changes were seen in the bronchial tree where the formation of a membranous cast had occurred in each case. In those infants that survived for more than 30 hours, separation of the membrane from the bronchial wall had occurred with resultant severe bronchial obstruction. Congestion and edema of the lung tissue was present in all cases as well as occasional large interstitial emphysematous bullae and areas of collapse. All specimens showed pleural hemorrhage. Lipoid material was present in alveolar macrophages and in the alveoli, which, it was inferred, had been inhaled in the smoke from the burning painted wood and linoleum. Death was due to progressive bronchial occlusion, pulmonary edema and infection, and retention of large quantities of mucus. The formation of the bronchial cast was attributed to irritant substances present in the smoke.

In conclusion, the authors list arguments for and against other modalities of treatment which might have been instituted, as well as other possible systems of nursery care. They infer that the proper place for the normal newborn baby is in a cot close to the mother's bed. The two surviving babies are now apparently normal. —*James H. Holman, M.D.*

Experimental Frostbite; an Inquiry Into the Effect of Rapid Thawing in the Acute Stage. JOSEPH A. ARENA, JR., and ALEXANDER BLAIN, III. *Surgery*, 1955, 37: 175.

Thirty adult rabbits weighing approximately 2 to 2.5 kgm. comprise the series in this study. Fifteen served as controls in that after severe frostbite the frozen extremity was allowed to thaw out at room temperature. The right hind leg of each of the rabbits was prepared by removing most of the hair with an electric clipper and the remainder with a barium sulfide depilator. Nembutal was given intravenously for anesthesia, after which the extremity was immersed for 30 minutes in a mixture of acetone and solid carbon dioxide which was maintained at minus 10 degrees C. This approximated 300 degree minutes for exposure and produced a standard lesion. Immedi-

ately after exposure to cold the frozen extremity of the animal to be treated was immersed for 30 minutes in a constant water bath maintained at body temperature. In the control the thawing at room temperature resulted in hyperemia with slowly increasing edema in the next 24 hours.

In the treated animals the immediate changes occurring in the first 5 minutes was striking. These consisted of scattered petechiae in the affected area, demonstrating moderate to severe hemorrhage into the subcutaneous tissues. At the end of 30 minutes the frostbitten area was 4 to 5 times larger than normal. It appeared that the rapidity of edema formation paralleled the rate of thawing. Within the next 24 hours blebs and fissuring with weeping appeared in both treated and untreated animals that were more exaggerated in the animals subjected to rapid thawing. In 6 to 8 days the control animals exhibited scattered areas of dry gangrene and the treated animal a mummified dry gangrenous extremity.

Under the conditions of these experiments rapid thorough warming of the frostbitten areas was of no value in preventing loss of tissue as compared to tissue loss in the controlled animals warmed at room temperature. The lesion appeared to be made more severe with more extensive edema in the early stages of treatment and more pain in the treated extremities.

It is the belief of the authors that in the acute stage of severe experimental frostbite, rapid thawing, sympathetic blocks and anticoagulants are of no value. It would appear that the present confusion regarding the efficacy of rapid thawing in the treatment of frostbite is probably due to the study of experimental lesions which are not comparable.

—*Allan D. Callow, M.D.*

Modern Considerations of Major Hand Infections. J. Edward Flynn. *N. England J. M.*, 1955, 252: 605.

Since the advent of antibiotics there has been a marked decrease in the prevalence of hand infections as well as vastly improved results in their treatment. However, this constitutes no reason for decreasing the study and teaching of the anatomy, clinical aspects, and treatment of major hand infections. These conditions present a major challenge in the presence of diabetes and penicillin-resistant strains of staphylococci.

Kanavel stressed the importance of differentiating lymphangitis from other major infections of the hand and reiterated the need to distinguish superficial from deep lymphangitis. The outstanding differential point is that with deep lymphangitis there is usually a rapid and striking increase in swelling of the entire hand and forearm. Lymphangitis is estimated to be between 15 and 25 per cent as frequent as it was before the antibiotics. While the complications of lymphangitis have been greatly decreased, the possibility of their occurrence should be kept in mind. The deep lymphatics are close to the tendon sheaths and may cause suppurative tenosynovitis.

Deep fascial space abscesses have occurred about one-fifth as frequently as before antibiotics were available at the Boston City Hospital. Tenderness over the palmar aspect of the space involved is the most important sign. The position of the fingers is significant. The index finger is usually flexed when the thenar space is involved. The middle and ring fingers are flexed with abscess of the midpalmar space.

More investigations of acute suppurative tenosynovitis than of the other major hand infections have been reported since the advent of the antibiotics. Knowledge of the sheaths is basic for the proper treatment of the complication. Adequate incision and drainage as soon as the diagnosis is made, followed by the parenteral administration of antibiotics, is the best treatment.

Six illustrations with a discussion of the anatomy involved are included in the original article. Incisions for draining infected tendon sheaths, radial and ulnar bursae, and spaces in the wrist and forearm are depicted. The validity of treatment established before the use of penicillin is stressed.

—*Kenneth E. Sherman, M.D.*

Median Nerve Palsy Associated with Acute Infections of the Hand. David Bailey and J. F. Bolton Carter. *Lancet.* Lond., 1955, 1: 530.

This article concerns 2 cases recently seen at the University College Hospital in London, wherein median nerve paralysis resulted from acute pyogenic infection of the hand.

In the first case a 58 year old woman had cut her right thumb on a broken milk bottle. Sixteen hours later symptoms and signs of a spreading infection developed in her hand and she was given penicillin. Conservative measures were employed but still the hand remained tensely swollen for a period of 6 days. Nineteen days after this injury the first sign of nerve damage was found in the form of a anesthesia in the region of the distribution of the median nerve in the hand. After another week muscular weakness showed up and this again was typically in the motor distribution of the median nerve. It was decided to explore this nerve at the wrist, and this was done through a right angle incision across the wrist and into the thenar eminence of the hand. The median nerve was found to be flattened and almost black from a point about half way along the carpal tunnel to a point approximately 2 cm. distal to this, beyond which it became normal. Much granulation tissue with some degenerated material that looked like a gelatinous substance was also found in this deep region of the wrist and hand.

Six months later, the patient had resumed her usual activities and nerve recovery was practically complete.

The second case was that of a 53 year old housewife who had pricked her thumb with a thorn. A rapidly spreading cellulitis developed and in 48 hours symptoms and signs of median nerve damage were seen. An incision was made across the distal flexor crease of the wrist and when the deeper tissues were reached a clear yellow fluid was encountered. The transverse carpal ligament was divided distally for half an inch and the tendons and median nerve appeared normal at this level. It was thought that adequate decompression had been effected and nothing further was done. In 48 hours however, signs of increasing nerve paralysis indicated that further exploration was needed and this was done promptly. The median nerve at the distal end of the tunnel appeared to be narrowed as if

by compression. There was a patchy pink discoloration extending approximately for half an inch. Conservative measures were continued for 2 weeks, during which the severe inflammatory reaction gradually subsided. The paralysis and anesthesia were much slower to subside than the inflammation, but still after 8 weeks there was almost complete recovery. Protracted paresthesia in this hand, especially when it was exposed to thermal extremes, was quite bothersome for this patient.

In view of their experience with these 2 cases, the authors suggest that any case of acute infection of the hand complicated by signs of interference with the function of the median nerve should be treated by division of the transverse carpal ligament. This treatment should be carried out early before the nerve has been irreversibly damaged, and it should be complete to provide effective decompression. In neither of their 2 cases did any permanent disability arise from the division of this ligament and in both cases the scar was inconspicuous. —*Matthew H. Evoy, M.D.*

The Bacterial Flora of the Blood Stream in the Korean Battle Casualty. Robert B. Lindberg, Theodore F. Wetzler, Arthur Newton, John M. Howard, and Others. *Ann. Surg.*, 1955, 141: 366.

Blood cultures were obtained from 170 severely wounded men an average of 4 hours after wounding. These patients were divided into 2 groups. The first group included 117 men, 30 per cent of whom had received penicillin and/or streptomycin before blood was taken for culture. Of the second group, 71 per cent had received penicillin and streptomycin. The time lag was similar in both groups, and the two groups were alike with respect to the degree of injury and the presence and degree of shock.

Blood cultures from 20 normal soldiers were negative. In the first group 10 per cent had positive cultures, mostly of the Staphylococcus albus and various bacilli. All of these could have been due to contamination. In the second group, 21 per cent had positive cultures, with streptococci in 4 and clostridia in 2 of the patients. There was no relation to time lag, degree of shock, visceral perforation, or antibiotic administration.

The authors believe that the true incidence of positive blood cultures should be between 4 and 6 per cent rather than the 13.5 per cent as found in this series. The wound is the portal of entry. Vascular collapse did not appear to alter the incidence of positive cultures. Of 30 casualties who died of their wounds, only 3 had positive cultures, and of 38 patients in severe shock, only 3 had positive cultures.

—*Victor M. Bernhard, M.D.*

The Bacterial Flora of Battle Wounds at the Time of Primary Débridement; a Study of Korean Battle Casualty. Robert B. Lindberg, Theodore F. Wetzler, John D. Marshall, Arthur Newton, and Others. *Ann. Surg.*, 1955, 141: 369.

Battle wounds in Korea were cleaned with soap and water and the surrounding area was painted with merthiolate. Small blocks of skin, subcutaneous tissue, and muscle were then excised from the edges of the wounds and placed in culture media. Cultures were also made of 21 samples of soil from the battle area, skin swabs from 40 normal combat soldiers, and 35 samples of clothing.

Tissue from 84 per cent of the wounds during the summer months contained clostridia, of which 44 per cent were pathogenic. The larger wounds showed the highest incidence of pathogenic clostridia. Cultures made in winter showed only 36 per cent of clostridia and in this group the size of the wound made no difference. The pathogenicity of the clostridia was determined in guinea pigs and found to be similar to that described by others. Antibiotic sensitivity studies on the isolated clostridia showed them to be most susceptible to aureomycin and terramycin.

Aerobic flora were present in 89 per cent of the wounds cultured in summer and in 81 per cent in the winter. Staphylococci and streptococci were more common in winter and the coliform types were more frequent in summer.

The lower incidence of clostridial contamination in winter is probably a result of the freezing temperatures and the presence of ice and snow which prevents direct contact with the soil. The higher incidence of streptococcal and staphylococcal contamination in the winter months may reflect the increased incidence of upper respiratory infections during this season. The prominence of colon bacilli in the summer is probably the result of fertilization of the soil with human feces.

Although there was a high incidence of simple contamination with the clostridia, the actual incidence of infection was much less. In the Korean campaign the incidence of infection was .08 per cent in a series of 4,900 casualties. This is definitely less than in World War II, and is probably the result of earlier débridement, the repair of arterial injuries, and the consistent use of antibiotics.

The *in vitro* sensitivity studies indicated that prophylaxis with the newer antibiotics might be more effective than penicillin. The latter was used routinely in all casualties in this study.

—*Victor M. Bernhard, M.D.*

The Bacterial Flora of Healing Wounds; a Study of the Korean Battle Casualty. Joseph G. Strawitz, Theodore F. Wetzler, John D. Marshall, Robert B. Lindberg, and Others. *Surgery*, 1955, 37: 400.

Eleven patients wounded in Korea during March and April, 1953 were selected on the basis of accessibility of the wound for serial biopsies and because its location was distant from any focus of subsequent contamination. In most of the patients the wound of entrance in the skin was small compared to the underlying destruction of tissue.

At the time of initial débridement, at foreward installations, tissue blocks were made from healthy muscle and from devitalized muscle in the base of each wound. Subsequently, tissue blocks from typical areas of healing muscle were taken at 2 day intervals during the ensuing week. Each block was placed in a medium of modified Robertson's cooked meat broth. These specimens were incubated for 24 hours at 37 degrees C. and then 1 ml. was transferred to thioglycolate broth and incubated for an additional 18 hours.

A yeast extract blood agar plate and a chloral-hydrate sodium azide plate were streaked with a 4 ml. loop from the thioglycolate subculture and incubated anaerobically for 40 hours.

Nine of the 11 wounds contained one or more species of clostridia at the time of débridement. One wound did not demonstrate clostridia on initial culture but showed one species on the fifth day. Clostridia were absent from two-thirds of the wounds when they were studied after initial surgery.

All wounds contained a rich flora of gram-positive and gram-negative aerobes which persisted during the first week of healing.

The primary surgery of these wounds consisted of débridement of the skin, subcutaneous tissues, and muscle. The wounds were then covered with fine mesh gauze and a thick sterile dressing. Each patient was given penicillin, (300,000 units) and streptomycin (0.5 gm. intramuscularly every 12 hours). The bacteriologic studies indicated that this treatment was adequate.

Two wounds in which adequate débridement was not carried out showed clinical evidence of infection. These findings are consistent with the belief that nonviable tissue is one of the necessary requirements for maintaining clostridia.

At the time of secondary closure, pathogenic aerobic organisms are often present in the wound, but in the absence of other deterrents they do not appear, clinically, to interfere with wound healing.

—*Frederick W. Preston, M.D.*

Aseptic Disturbance and Infection by the Prophylactic Use of Sulfonamide Powder (Ueber das Verhalten von aseptischer Stoerung und Infektion bei der Wundprophylaxe mit Sulfonamidpuder). H. Fuss. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 280: 112.

THE HEALING of a wound can be disturbed by primary infections, aseptic disturbances (hematomas, necroses, dehiscence), and by secondary infections. From his statistics involving several hundred cases, the author noted a decrease in the incidence of primary infections following the use of sulfanamide powder, but there was also an increase of aseptic disturbances and an increase of secondary infections due to prior aseptic disturbances.

In reviewing his data, Fuss states that there will be in general a slight decrease of the healing tendency in wounds exposed to infections when sulfonamide powder is used prophylactically, especially if large lesions are present. He believes that in such cases the outbreak of an infection is only temporarily delayed.

—*Frank R. Lichtenheld, M.D.*

Studies on the Distribution and Fate of S35 (Benzylpenicillin) in the Body. SVEN ULLBERG. *Acta radiol.*, Stockh., 1954, supp. 118.

THIS INVESTIGATION was designed to study some of the pharmacologic properties of benzylpenicillin (penicillin G), with emphasis on its distribution in the body, and the mechanism of its chemical binding, inactivation, and excretion.

The biosynthesis of radioactive penicillin is discussed with respect to the various isotopes which can be used for labelling penicillin, and their respective advantages and disadvantages in pharmacologic investigations. The culture and extraction methods employed in the preparation of S35-labelled benzylpenicillin are described.

The histologic technique utilized in the preparation of the autoradiographs was adapted to the requirements imposed by the water solubility of penicillin, and permitted tape-sectioning of frozen whole adult mice in the freeze-room and direct mounting on methacrylate slides. After appropriate exposure and development, the varying density of histologic survey sections was investigated by quantitative beta-radiography utilizing a Kodak densitometer. This investigation provided the basis for calculations of self absorption of radiation from a histologic section.

The distribution of radio-penicillin with respect to cells and the body fluid was investigated with the Geiger-Mueller tube of end window type on dehydrated material. Penicillin was found to penetrate into the red cells to a very limited extent, and the penetration into Ehrlich's ascites carcinoma cells was also found to be poor, while penicillin freely penetrated into the white blood cells. Equilibrium dialysis studies with radiopenicillin confirmed early observations that benzylpenicillin is partially bound to a constituent of blood plasma; this constituent is serum albumin. From radioactive measurements of the per cent bound at different penicillin concentrations, it appeared that slightly more than half the penicillin was protein bound. The per cent of bound penicillin was found to be greater at the lower concentrations.

The rate of passage of penicillin through the capillary wall was studied on anesthetized cats with ligated renal arteries. Judging from the blood concentration curves obtained, distribution of penicillin from the blood had largely ended after 25 minutes and the final distribution volume was found to be lower than the recorded figures for the extracellular space. This implies that penicillin does not penetrate intracellularly to a large extent. However, it seems probable that the binding of penicillin to serum albumin affects distribution, and, with the vascular wall functioning as a semipermeable membrane, the true distribution volume thus may be larger than the apparent volume.

Survey autoradiographs illustrated the distribution of penicillin in adult mice at different times after intravenous injection. The gross distribution, according to the autoradiographs, and quantitative estimations on sections with a Geiger-Mueller tube and counter agree with most of the recorded observations made with microbiologic methods. The concentration of penicillin in the kidneys and in the liver was higher than in the blood, but in other organs, during the whole course of distribution and excretion, it was lower than the recorded blood level. In the lung and subcutaneous tissues the concentration approached that of the blood, whereas in most other tissues it was considerably lower. The lowest level was observed in the central nervous system. The radioactive penicillin disappeared rapidly from the tissues; some entered the intestines and passed out with the feces. Several hours after injection the penicillin excreted in the intestines dominated the distribution picture.

Large survey autoradiographs of pregnant animals permitted studies of tracer distribution in the fetus and fetal fluids in utero.

Probenecid ("benemid") had the effect of delaying excretion of penicillin, thereby permitting autoradiographic investigations over a longer period after injection. Autoradiographs of the kidneys disclosed that probenecid lowered the concentration of penicillin in the renal tubules.

Some observations were made on the penetration of penicillin into abscesses. The penicillin appeared to penetrate through the abscess membranes. On the other hand, further diffusion towards the center of the abscess contents was very poor in the chronic cases. The radioactive substance in the abscess contents was still detectable after penicillin had disappeared from the normal tissues. Penicillin penetrated very poorly into dry necrotic areas. In the necrotic boundary zone adjacent to normal tissue there was, however, a high content of radioactive substance 30 minutes after injection.

The inactivation of penicillin during its passage through the body was investigated in cats and guinea pigs. Intact radioactive penicillin was separated from breakdown products by extraction with amyl acetate and by paper electrophoresis. In extraction experiments on urine from experimental animals there was a concentration of degradation products of penicillin of about 6 per cent after 30 minutes, rising to 10 per cent after 3 hours. Electrophoresis of urine disclosed one spot containing radioactive substance but this was without biologic activity. The rate of migration of this spot corresponded to that of S35-penicilloic acid prepared in vitro by the inactivation of S35 penicillin. The distribution of penicilloic acid in the body was essentially the same as that of benzylpenicillin. —*Earl W. Cauldwell, M.D.*

Side Effects of Antibiotics in Surgery (Nebenwirkungen der Antibiotica in der Chirurgie). F. LINDER. *Chirurg.*, 1955, 26: 7.

THE SIDE EFFECTS of antibiotics may be divided into 3 groups: (1) toxic reactions, (2) allergic reactions, and (3) nonspecific untoward effects.

Toxic reactions are rare and, as a rule, not serious. Irritation of the gastrointestinal tract or thrombophlebitis at the site of intravenous injection may serve as examples of this type of reaction. The dose of penicillin for a spinal injection should not exceed 10,000 units. Tetracyclin apparently does not produce toxic organic lesions. Prolonged administration of chloromycetin is fraught with danger of aplastic anemia. Viomycin, used in the performance of pulmonary resection for tuberculosis of the lungs, is exceedingly toxic, especially for the kidneys.

Sensitization to antibiotics is likely to develop, particularly after their local application, in the form of powder, ointment, lozenges, or aerosol inhalations. Allergic reactions may be divided into 5 groups: (1) contact dermatosis, (2) various exanthematous-eczemoid reactions, (3) urticaria, (4) anaphylactic shock characterized by hypotension, profuse perspiration, asthenia, dyspnea, cyanosis and unconsciousness (the author was able to collect from the literature 53 reports of fatal anaphylactic shock produced by penicillin), and (5) inflammatory processes of the mucous membranes, such as glossitis or stomatitis.

Moniliasis represents an example of a nonspecific side effect of the antibiotics. The infection may affect not only the oral cavity but also the skin, brains, cardiac valves, lungs, esophagus, gastrointestinal tract, kidneys, ureters, and epididymis. The saprophytic pseudomonas aerogenes or pyocyaneus bacillus may become pathogenic after suppression of the primary infectious agent by antibiotics.

Accurate diagnosis and therapeutic judgment are essential for the avoidance of untoward effects produced by antibiotics. —*Joseph K. Narat, M.D.*

ANESTHESIA

A Preliminary Study in the Peripheral Circulation During Deep Hypothermia; Observations on Decreased Suspension Stability of the Blood and Its Prevention. LARS-ERIK GELIN and BERTIL LÖFSTRÖM. *Acta. chir. scand.*, 1955, 108: 402.

THE AUTHORS briefly report the observations on blood flow in the conjunctival vessels of dogs undergoing hypothermia. The authors demonstrate, photographically, impaired capillary circulation with red cell aggregations in the capillaries and venules which increase in number as the temperature of the dogs drops from 28 to 25 degrees C. Complete cessation of the capillary flow occurs at lower temperatures, but this is still reversible on rewarming of the animals.

By withdrawing blood and infusing dextran of low viscosity, it was possible to lower the temperature of the dogs from 12 to 9 degrees C. and still have good capillary flow without extensive aggregations of the red blood cells.

It is the authors' contention that the impaired capillary circulation explains the defective carbon dioxide elimination, the irreversible ventricular fibrillation, the lung damage, and the ecchymosis which has been noted clinically during hypothermia. It is their feeling that hemodilution with dextran may prevent these complications. —*Harold M. Unger, M.D.*

Cardiac Arrest; Some Etiologic Considerations with Reports of 17 Cases. ROBERT PATRICK BERGNER. *Anesthesiology*, 1955, 16: 177.

SEVENTEEN CASES of primary cardiac arrest which occurred during the administration of 35,000 anesthetics during a 4 year period are presented. Eleven of these patients are alive and well; 6 died because of errors in diagnosis and treatment or because of conditions that prevented adequate treatment.

The anesthetic factors most often responsible for cardiac arrest are deficiency of oxygen, carbon dioxide excess, overdose of anesthetic, or insufficient anesthesia in the presence of strong sensory stimulation.

The surgical causes of cardiac arrest include unwise manipulation of the abdomen or thoracic viscera, obstruction of a main vessel, sudden or uncontrolled hemorrhage, and excessively prolonged surgery. Air embolism during surgical intervention is usually indistinguishable from primary cardiac arrest.

Sudden death occurring in the operating room may be due to the patient's disease and may simulate

cardiac arrest; it may be due to coronary thrombosis, a cerebral accident, an embolus, or metabolic abnormalities.

The treatment of any type of cardiac arrest involves three fundamental principles:

1. Artificial respiration
2. Thorocotomy and cardiac massage
3. Elimination of the cause of cardiac arrest

Most cardiac arrests during surgery and in the operating room are of the secondary type, that is, the heart has stopped beating because the patient has died from other causes. Occasionally, a primary type of cardiac arrest is encountered in which the patient is unconscious, yet alive for a few moments, but will die from cardiac arrest unless action is restored.

Seventeen cases of primary cardiac arrest are presented and discussed, with emphasis on the cause of the catastrophe. Most instances of primary cardiac arrest are caused by anesthetists and surgeons rather than by anesthesia and surgery. Treatment should be immediate and vigorous. —*Mary Karp, M.D.*

Hypothalamopituitary "Neurocrinia" in the Course of Shock and Controlled Generalized Hypothermia; Experimental Study (La "neuricrinie" hypothalamo-hypophysaire au cours du choc et de l'hypothermie généralisée controlée; recherches experimentales). MARCELLO MONACI and PIERO NOCENTINI. *Anésthesie*, Par., 1955, 12: 3.

THE EXISTENCE of neurosecretion or "neurocrinia" in various species of animals has been demonstrated by numerous investigators. Granules and droplets of a colloid substance are elaborated by ganglionic cells of certain hypothalamic nuclei, tuber cinereum and the pituitary gland.

The authors undertook a study of the neurosecretory process in the supraoptic and paraventricular nuclei of the hypothalamus in animals under normal conditions and in those exposed to controlled generalized hypothermia. In another series of experiments hypothermia was produced in neuroplegic animals. Finally, morphologic and histofunctional changes of the mentioned nuclei under the influence of traumatic shock, alone or combined with controlled hypothermia, were investigated.

The experiments were performed on 24 rabbits. Hypothermia was obtained by the application of icebags, neuroplegia by hypodermic injections of largactil, and traumatic shock by laparotomy and exteriorization of intestinal loops. The animals were sacrificed 8 hours after the start of the experiment, diencephalon and hypophysis were embedded in celloidin and paraffin, and sections were stained, in addition to the use of customary dyes, according to Gomori's method.

Disappearance of neurosecretion in the supraoptic and paraventricular nuclei and in the neurohypophysis was observed in the course of controlled generalized hypothermia. There were no noticeable regressive alterations in the cytoplasm or in the nuclei. In other words, the findings suggested that evacuation of neurosecretion was taking place.

In neuroplegic animals the depressing effect of largactil on the diencephalon caused a secretory blockade of ganglion cells and a lesser accumulation of secretion within the neurohypophysis, as compared to controls. In animals exposed to refrigeration the Gomori-positive substance was practically absent in ganglion cells and neurohypophysis, while regressive processes were in evidence. These findings can be interpreted as the result of the exceptionally intensive peripheral demand necessary for maintenance of equilibrium.

Regressive changes in ganglion cells were missing in animals subjected to traumatic shock preceded by hypothermia. Neurosecretion was absent in such animals as well as those in which shock without hypothermia was produced. —*Joseph K. Narat, M.D.*

The Effect on Cerebral Circulation and Metabolism in Man of Acute Reduction in Blood Pressure by Means of Intravenous Hexamethonium Bromide and Head-Up Tilt. HRANT H. STONE, THOMAS N. MACKRELL, and RICHARD L. WECHSLER. *Anesthesiology*, 1955, 16: 168.

STUDIES were made of arterial and internal jugular blood gases, cerebral blood flow, oxygen consumption, and vascular resistance in 10 patients chosen at random, before and after systemic hypotension was induced by the intravenous injection of hexamethonium bromide and a 15 degree headup-tilt.

An average reduction of 44 per cent in the mean arterial blood pressure failed to produce a significant change in the cerebral blood flow or metabolism. The cerebral circulation was maintained by a significant and adequate reduction (46%) of the cerebrovascular resistance. These findings were similar to those obtained with other hypotensive agents, such as histamine dihydroergocornine, hydrazinophthalazine, tetraethyl ammonium bromide and protoveratrine. Therefore, it might appear that relaxation of the cerebrovascular tone is a nonspecific response to the lower blood pressure by any hypotensive means rather than a specific response to the agent itself.

The ability of the cerebral vasculature to dilate during the periods of hypotension induced by the various agents with a maintenance of cerebral blood flow demonstrates the complete compensation of which the cerebral vessels are capable. From the results of the present study it is not possible to predict at which level of mean arterial blood pressure this compensation fails.

The significant decrease in the arterial and internal jugular oxygen content without a significant change in the cerebral metabolism probably reflects an increase in the total blood volume. This hemodilution has been demonstrated by direct determinations of the plasma volume.

Although this study demonstrates the completeness with which cerebrovascular tone can adjust to an acute decrease in mean arterial blood pressure, it does not lend itself to generalizations prognosticating comparable compensation in every patient. The safety of deliberately induced hypotension depends on the cerebral maintenance of cerebral nutrition during the period of reduced blood pressure, although clinical practice has demonstrated how well young adults tolerate hypotension. This has not been experienced with the aged and sclerotic patient.

—*Mary Karp, M.D.*

The Effect of Hypothermia on the Renal Circulation of the Dog. B. E. MILES and H. C. CHURCHILL-DAVIDSON. *Anesthesiology*, 1955, 16: 230.

A STUDY was made of the glomerular filtration rate and renal blood flow in 6 anesthetized dogs during surface cooling to temperatures between 28.4 and 21.4 degrees C. (83 and 70.5 degrees F.).

Inulin and para-aminohippurate (P.A.H.) clearances were carried out and estimated. An estimate of renal vascular resistance was made by dividing the average mean blood pressure by the calculated renal blood flow.

The percentage fall in renal blood flow appears to be of the same order as the rate of drop in cardiac output. The mean effective renal blood flow falls to approximately half the normal at 29 degrees C. and to one-fourth normal at 24 degrees C. Renal resistance increased in every case, showing that the fall in blood flow was not entirely attributable to the fall in blood pressure.

Satisfactory P. A. H. extraction ratios were found down to 25 degrees C., thus demonstrating that P.A.H. extraction ratios were well maintained at low temperature and that the kidney is still capable of considerable osmotic work at very low temperatures.

—Mary Karp, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Modern Progress in Plastic Surgery (Moderni progressi della chirurgia plastica). A. DE LUCA. *Sicilia san.*, 1954, 7: 609.

THE AUTHOR reviews the progress of plastic surgery. He states that the Italians did not keep up with the progress made in other European countries, and especially America. Up to the year of 1948 there were only two centers where plastic surgery was being practiced —one in Bologna under the direction of Cesare Gavino, and the other in Milan under the direction of Sanvenero Rosselli. After this, centers were developed in Catania, Rome, and Torino in 1952. At present, the specialty of plastic surgery is being recognized in Italy as a whole.

The fundamental procedures used in plastic surgery, such as direct wound closure, cutaneous transplants, and autogenous pedunculated transplants are described.

—Lucian J. Fronduti, M.D.

Skin Grafts for Hairless Areas of the Hands and Feet; a Preliminary Report. JEROME P. WEBSTER. *Plastic & Reconstr. Surg.*, 1955, 15: 83.

A STUDY has been made by the author of the results of grafts of hair-bearing skin to the hairless skin areas of the hands and feet. Until recently, pedicled flaps or free full or split thickness grafts from hair-bearing donor sites had been used. A series of cases with excellent photographs are presented, showing the poor results which often occur. Increased pigmentation, particularly in negroes, frequently occurs. Thinning of the subcutaneous fat and infection of the hair follicles is common. Ulceration over bony prominences may result.

As a remedy for these complications, the author suggests the use of grafts from hairless areas to replace the tissue defects of the hands and feet which are normally hairless. He proposes the use of the medial pedal area as the most useful site because of its inconspicuous location, freedom from significant underlying bony prominences, and ready accessibility. He reports several cases in which he has used the site for full thickness grafts, but he has not yet used it for split thickness grafts. He feels that the site will be just as satisfactory for split thickness grafts. The donor site may be covered with a graft from any suitable hair-bearing area. The bolus type of dressings are used exclusively and with their aid the author has obtained a 100 per cent take of all of his grafts.

—Harold M. Unger, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

The Diagnosis of Abdominal Cysts in Infants and Children. JOHN W. WILSON. *Radiology*, 1955, 64: 178.

THE PREOPERATIVE DIAGNOSIS of abdominal cysts in children is important for the operative mortality bears on inverse relation to the frequency of correct preoperative diagnosis.

The cystic abdominal mass is soft, yielding, and fluctuant, and it may change size rapidly with variations in the fluid content. This finding, plus needle aspiration with the injection of air or contrast medium, is of aid in distinguishing the cystic from the solid mass.

Omphalomesenteric (vitelline) duct cysts arise from incomplete obliteration of the vitelline duct. Four variations can result. The first of these is complete patency of the vitelline duct with communication between the ileum and the umbilicus. This is easily demonstrated by the injection of opaque medium and x-ray studies.

The second variation of vitelline duct cyst occurs with persistence or patency of the proximal portion of the duct with obliteration of the umbilical portion. This is the well known Meckel's diverticulum. Roentgen studies are useless unless some barium or air be trapped in a dilated cyst.

The third variation is that in which both the proximal and distal portions of the vitelline duct are obliterated. This results in a cyst which is midabdominal in the roentgenograms and displaces the surrounding gut without other definitive x-ray signs. Lateral movement of this mass will cause puckering of the umbilicus in the event that a fibrous band connection is present.

The fourth variation of vitelline duct cyst is that in which there is obliteration of the proximal duct segment. The sinus can be injected at the umbilicus with an opaque medium and the medium will not communicate with the bowel.

Enterogenous cysts result from a duplication of a segment of the gastrointestinal tract. Clinically, as a result of the narrowed lumen, there is frequently evidence of at least partial intestinal obstruction. Roentgenograms show a well defined intraperitoneal mass displacing the adjacent bowel. A barium meal shows a constantly narrowed segment of bowel. The barium almost never enters the cyst itself as a direct opening is only very rarely present.

Mesenteric and omental cysts arise from endothelial-lined lymphatics which do not communicate with the normal lymph channels. Aspiration of these cysts shows either serous or chylous fluid. Chylous fluid indicates the cyst is in the jejunal mesentery as this is the segment of bowel from which fat is absorbed. An abdominal cyst without evidence of partial obstruction and without encroachment on the adjacent bowel on contrast study is most likely a mesenteric cyst. Such a cyst is a slowly enlarging mass which is soft, fluctuant, and nontender. There are no signs of intestinal obstruction associated with such a cyst.

An omental cyst is identical with a mesenteric cyst except for its anatomical location.

Pancreatic cysts cause the expected extrinsic pressure defects on the stomach, duodenum, and colon, depending wholly on the location of the cyst in the pancreas. Findings in roentgenograms of the left chest, such as elevation and limitation of the diaphragm with basilar atelectasis, pneumonitis, or pleuritis, also suggest pancreatic origin of the abdominal mass. This is because the lesser omental sac is limited superiorly by the left diaphragm.

Choledochus cysts or common bile duct cysts generally present a triad of symptoms consisting of abdominal mass, jaundice, and pain. This triad is almost diagnostic of common bile duct cyst in the first decade of life. This cystic mass also increases in size after eating and hence can be separated from other cysts, except the vitelline duct cyst, because of this. Aspiration of this mass with subsequent injection of an opaque medium will show the communication between the biliary and gastrointestinal tracts. This is well shown physiologically by the visualization of the kidney structures on films taken after this injection. Roentgenograms also will show the cyst to be in the right upper quadrant between the liver and the sweep of the duodenum, and will also show displacement of the duodenum anteriorly and to the left.

Urachal cysts result from failure of obliteration of the communication between the umbilicus and urinary tract. If the entire tract is patent, an injection of opaque medium will nicely demonstrate this connection on x-ray films. If, however, the umbilical end of the urachus is obliterated, then the opening may be seen at fluoroscopy and may be depicted on x-ray films after cystography. Finally, if there is obliteration of the bladder and umbilical portions of the urachus, then x-ray and clinical studies will only demonstrate a midsagittal suprapubic mass lying anteriorly on lateral views.

Ovarian cysts are unusual under 10 years of age. When present x-ray studies will show an intra-abdominal mass in the pelvic location. Anteroposterior films of the abdomen will demonstrate lateralization; lateral views will demonstrate that the mass is in the midcoronal plane.

Hydrometrocolpos is cystic dilatation of the vagina and uterus in infants. It results from excessive uterine secretions and an imperforate vagina due either to an imperforate hymen or vaginal atresia. The cyst is defined as a homogeneous density in the midsagittal and midcoronal planes displacing the bowel superiorly and laterally. The location and position of this cyst is well depicted by filling the urinary bladder with an opaque medium and filling the rectosigmoid region with barium. Aspiration of the retained fluid generally results in a complete cure.

—*John J. Gaughan, M.D.*

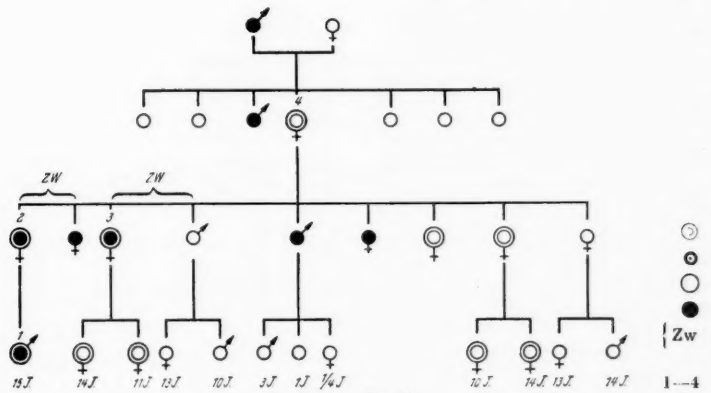

FIG. 1. (Liess)

Familial Studies on the Subject of Congenital Subchondral Disturbances of Cartilaginous Ossification (Familienuntersuchung zu den angeborenen subchondralen Knorpelverknoecherungsstoerungen). G. LIESS. *Fortsch. Roentgenstrahl.*, 1955, 82: 169.

THE PROBAND was a stone mason's 15-year-old apprentice. A year previously he had noted thickening of the finger joints. Examination disclosed the fact that the middle joints of the fingers were somewhat thickened and that the second finger on both hands evidenced a slight deviation in the regions of the middle and terminal joints.

The roentgenologic findings in this patient are shown in a series of roentgenograms under case 1. Not much textual matter has been appended, since almost identical findings in another patient (Erwin K.) were discussed a year ago in this same journal and by this same author (*Fortsch. Roentgenstrahl.*, 1954, 80: 2). Suffice it to say that the changes observable in the hands were quite similar to the findings in a case of Thiemann-Fleischner's disease; those in the spine resembled the changes in an instance of Scheuermann's disease; there was present a typical patella partita and the elbow joint exhibited accessory ossicles and evidence of osteochondrosis dissecans.

The changes roentgenologically visible in the bones and joints of the mother of the proband involved the same skeletal regions and seemed to be merely a more advanced stage of the changes exhibited by those of the proband himself.

In the sister of the mother, the changes were quite similar (there was no involvement of the knee-cap) and only the changes in the hands seemed to be more advanced, in apparent accordance with the fact that she had been engaged for many years in hard physical labor.

In the mother (grandmother of the proband) the changes were even more severe and deforming. Finally, it was determined anamnestically that the stigma came through the great grandmother of the proband.

We append here in classical symbols the family tree of 4 generations. It might be well to mention that the first four symbols indicate the members of the family which have been subjected to study. The double-contoured circles indicate that the subject showed no roentgenologic findings; the circle with the central black spot indicates that roentgenologically the subject was diseased; the simple circle indicates that the subject was without history of disease and the simple circular black spot indicates that the subject gave a history of the disease. The letters "ZW" indicate that the pair included were twins.

This table shows that the hereditary stigma in this family is dominant and of strong penetrance.

The significance of this study, however, lies in two matters of evidence. The first of these is that no evidence of aseptic necrosis was found in any of the individuals, as has been postulated by other authors, but, the picture was that of a disturbance of subchondral ossification. The second is that the condition, as exhibited in the different individuals in the different age groups, suggested a single continuous process, i.e., all pictures represented merely different phases of the same hereditary disturbance of development.

The author believes that the cases of Thiemann, involving the epiphyses of the finger, those of Weil, involving the heads of the basal phalanges, and those of Dietrich involving the heads of the metacarpals, may all be included within this pathogenetic conception of a primary disturbance of enchondral ossification, and that the aseptic necroses arise as secondary manifestations. —*John W. Brennan, M.D.*

The Technique of Ascending Phlebography in the Lower Extremity. TORGAY GREITZ. *Acta radiol.*, Stockh., 1954, 42: 421.

THE VERTICAL POSITION in phlebography of an extremity is stressed since the "layering" effect of contrast material in the blood stream is least noticeable in this position and a true idea of the caliber of the vessels can be obtained. This was demonstrated by the author through in vivo experiments as well as by repeated studies in patients. It is also important that the flow of blood be upward to insure the best mixing of contrast agent and blood.

Phlebography of an extremity at an angle of 65 degrees in the horizontal plane was considered satis-

factory since there was little noticeable difference from studies performed at an angle of 90 degrees. When performed with the extremity in the horizontal position, filling of the deep veins was absent in almost half the cases, while present 100 per cent of the time with the extremity in the vertical position. Bauer's conclusions concerning the dilatation of deep veins in the horizontal position is disputed by the author on the premise that it was done under direct visualization at operation under unphysiologic conditions. Measurements of the diameter of the popliteal vein in horizontal and erect phlebography revealed a maximum difference of 2 mm.

The technique employed was as follows:

Sixty millimeters of a 35 per cent solution of unbradil were injected in a superficial vein of the dorsum of the foot in a period of one minute. A tourniquet or elastic bandage applied about the lower leg prevented the filling of superficial veins which might obscure the picture. Films were taken at right angles over a period of three minutes, ascending from the leg to the pelvis. Only an anteroposterior film was taken of the pelvis. No serious complications were encountered in over 400 phlebographies.

—*Harold L. Atkins, M.D.*

Results Attained in the Study of the Technique of Roentgenologic Enlargements with a New Small Focus Tube for Image Magnifications Greater Than 2 to 1 (Ergebnisse der radiologischen Vergroessenungstechnik mit einer neuen Feinstfokusroentgenroehre fuer Abbildungsmassstaebe groesser als 2: 1). K. ADERHOLD and L. SEIFERT. *Fortsch. Roentgenstrahl.*, 1954, 81: 181.

THE SMALLEST FOCAL SPOT in roentgen enlargement has been about 0.3 mm.; this permitted an enlargement of the roentgenologic image of about 2 to 1, with a maximum of 2.5 to 1. At the Technisch-Physikalisches Institute of the Friedrich-Schiller-Universitaet in Jena, Germany, there has been developed the smallest focus tube which can be regulated at the control panel to a focal spot ranging from 1 mm. to 0.03 mm. With this new apparatus the rays coming exclusively from the tiny, pointlike focal spot on the anode surface permit of enlargement of the image on the film, in not too thick objects, by as much as 11 to 1 without seious loss of image quality.

At this magnification details of shadow contrast which were visually subluminal become clearly visible. The method permits an interpretation of roentgenologic details which even the 2 to 1 magnification does not bring to light. In fact, a series of roentgenographic reproductions in the original text show the remarkable results to be anticipated. The results are no "lucky takes," but have been produced by careful and proper technique.

The only drawback of the method consists in the high amperage required, as too free use of repeated exposures or fluoroscopy with this apparatus brings with it the danger of irradiation over-dosage. This danger may be minimized by the use of the high definition screen.

In the series of roentgenograms in the original text the first 3 roentgenograms show the sella turcica without and with a high definition screen. Roentgenograms taken with the smallest focus technique show the results at magnifications of 2.5 to 1 and 4 to 1 of the wrist in a case of navicular pseudarthrosis; magnifications of the middle joint of a finger with osteoarthrotic changes in the bone; and magnifications of a 3 weeks old fracture of the radial distal epiphysis. A 5 to 1 magnification shows an old navicular fracture with beginning arthritis deformans (comblike osteophytes between the radius and navicular bone); another roentgenogram shows the talotibial joint with high grade osteoporosis of the bones. Finally, it is shown that even in objects as deeply placed as the bodies of the vertebral column, clear definition can be obtained with the smallest focus technique in a 3 to 1 magnification.

—*John W. Brennan, M.D.*

Simple Mastectomy and Radiotherapy in the Treatment of Breast Cancer. R. MCWHIRTER. *Brit. J. Radiol.*, 1955, 28: 128.

AFTER a critical examination of current methods of surgical and roentgen therapy for primary carcinoma of the breast, McWhirter presents the results of a treatment policy centered about simple mastectomy followed by radiotherapy in a series of 1,882 patients.

The author reiterates his old plea that crude survival rates, to include all patients referred, be used in evaluating any treatment program in order to avoid selection. He also states that the axillary and supraclavicular lymph nodes are anatomically and functionally one unit, effectively treated only by two opposed portals which include both areas. Using Wangensteen's estimate that there is involvement of supraclavicular or internal mammary nodes in 60 per cent of cases with positive axillary nodes, he proposes that the results of surgery could improve only with radical excision of the entire lymphatic drainage of the breast.

All patients are staged according to a modified Manchester clinical classification, as follows:

Operable (Manchester stages I and II). The primary tumor may be of any size, and the skin may show involvement up to and including ulceration, but there must be no isolated skin nodules. Minor degrees of fixation to the pectoral fascia are ignored. The axillary nodes may be enlarged but not fixed. There must be no enlarged supraclavicular nodes, nor evidence of more distant metastases.

Locally advanced (Manchester stage III and approximately half of stage IV). All cases too advanced for radical mastectomy by reason of complete fixation to pectoral fascia, fixed axillary nodes, or widespread involvement of cutaneous lymphatics, without distant metastases.

Distant metastases (remainder of Manchester stage IV).

The treatment policy involved simple mastectomy and radiotherapy for almost all of the operable patients and many in the locally advanced category. On about the tenth postoperative day radiotherapy was started, and a critical minimum tumor dose of 3,750 roentgens was delivered to the chest wall and lymphatic drainage in a three-week period, using a beam with a HVL of 3.7 mm. of copper. The details of technique are not given, and will be reported in a later article. Radical mastectomy was done in the cases of very obese patients in whom it was not possible to deliver

an adequate dose to the axilla, and in patients in whom it was feared that radiation might cause a flare-up of coexistent pulmonary tuberculosis. When there was extensive skin involvement, acute cancer, or when the primary tumor and axillary nodes formed one continuous mass, surgery was deferred and palliation was provided with the use of x-ray and hormone therapy.

With the program described, the five-year crude survival rates were as follows:

	Per cent
Operable (1,063 patients)	58
Locally advanced (546 patients)	30
Distant metastases (273 patients)	4
Total (1,882 patients)	92

Further tables are presented, showing the increase in five-year survivals if aged patients and those with distant metastases are not considered. Ten-year crude and adjusted figures for a group of 480 patients are also listed. Of interest is one tabulation showing no significant difference in survival rate when the location of the primary tumor in relation to the breast is considered! McWhirter points out that this plan can be applied to a much higher proportion of referred patients (about 85%), but cautions that "a satisfactory radiotherapy service is essential" before the method is more widely adopted.

Detailed presentation of the author's logic and statistics in this controversial approach to breast cancer is not possible; the original is recommended reading for all who come into frequent contact with this universal problem. The article is accompanied by 4 illustrations and 11 tables. —*Lawrence A. Post, M.D.*

MISCELLANEOUS

Lymph Drainage from the Breast to the Axillary and Parasternal Lymph Nodes, Studied with the Aid of Colloidal Au^{198}. K. A. HULTBORN, L. G. LARSSON, and I. RAGNHULT. *Acta radiol.*, Stockh., 1955, 43: 52.

THE AUTHORS studied 40 patients with breast carcinoma, in whom radioactive gold had been injected directly into the breast substance. In these studies, directional scintillation counters were used and uptake was observed in the region of the parasternal lymph nodes and in the axillary lymph nodes. Autoradiographs were made of operative specimens. It is interesting to note that regardless of the site of injection, the radioactive material was transported both to the axillary and to the parasternal lymph nodes in variable concentrations.

The authors suggest that a radioactive colloid with more energetic beta radiation might be a useful adjunct in the treatment of early parasternal metastases.
—*Moris Horwitz, M.D.*

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Congenital Abnormalities. VICTORIA P. COFFEY and W. J. E. JESSOP. *Irish J. M. Sc.*, 1955, 6: 30.

A SURVEY was made of congenital abnormalities observed in the newborn in a 14 month period at the Rotunda Hospital, National Maternity Hospital, and Coombe Hospital, Dublin, Ireland, and at St. Kevin's Hospital and its auxiliary, St. Patricks Home, Pelletstown, Ireland. Only major abnormalities noted at birth were included. The data from 217 abnormal babies were compared with information on 192 random normal controls from the same institutions during the period of study.

There was no significant difference between the over-all incidences of abnormalities in males and in females. However, anencephaly was six times more common in females than in males, and cleft lip and palate deformities were more frequent in males than in females.

Prematurity, as indicated by birth weight, was present in 35.4 per cent of the abnormal babies and in 6.8 per cent of the controls. The ratio of abnormal births to normal controls increased with advancing maternal age. Mongolism, especially, was more frequent with the older mothers.

Facts regarding the pregnancy were elicited by questioning the mother after birth and are therefore subject to inaccuracies of memory; 18.9 per cent of the mothers of abnormal babies and 8.9 per cent of the controls recalled excessive vomiting, and 18.4 per cent of the former and 3.6 per cent of the latter remembered having had "influenza" during pregnancy. The term "influenza" was considered nonspecific by the authors but was thought significant since they felt that it indicated a respiratory illness of sufficient severity to be recalled by the mother. There was no statistically significant difference between the mothers of abnormal babies and the controls regarding accidents during pregnancy.

The state of nutrition, as assessed clinically, was lower in the mothers of abnormal babies than in the controls. Plasma protein concentration and hemoglobin concentration were low in both groups of mothers, but they were not significantly different. Social status, as indicated by occupation, was the same in both groups.

Of the mothers with abnormal babies, 11.5 per cent had had a previous abnormal baby. This was true in only 4.7 per cent of the controls. There was a significant difference in the family history of the two groups; 16.5 per cent of the mothers and 9.7 per cent of the fathers of abnormal babies had a family history of congenital anomaly. In the control group the incidence of abnormalities was 4.1 per cent and 2.6 per cent, respectively.

This report presents initial findings in a long term study of congenital abnormalities in Ireland. No such project had been undertaken in that country previously. The findings are in general agreement with those from similar studies carried out elsewhere.

—Lockert B. Mason, M.D.

Idiopathic Hypogammaglobulinemia and Agammaglobulinemia; Review of the Literature and Report of a Case. GERARD SELTZER, SAMUEL BARON, and MILTON TOPOREK. *N. England J. M.*, 1955, 252: 252.

HYPOGAMMAGLOBULINEMIA and agammaglobulinemia are syndromes characterized by a greatly decreased or absent gamma globulin in the blood, with a resultant inability to produce antibodies; hence, it manifests itself by recurrent infections. When these are bacterial, they usually respond to antibiotics. Recovery is common after viral infections also, but just how survival is accomplished when no antibodies are produced is still a matter of speculation. Artificially administered antigens also fail to stimulate antibody formation and this constitutes one of the tests for the disease. The Tiselius electrophoresis method is the one most accurate for determining the gamma globulin level.

The case of a 27-year-old man with an 8 year history of recurrent upper respiratory infections is reported. One positive histoplasmin skin test was obtained during that time. Later tests were negative for histoplasmosis. The gamma globulin level was 0.02 gm. per 100 c.c., or 0.4 per cent of the total protein. Injection of typhoid-paratyphoid antigen failed to evoke an antibody response. There was apparent improvement in the ability to resist infections while on a program of monthly intramuscular injections of 7 gm. of gamma globulin.

—Stanley W. Tuell, M.D.

Disturbances of Sweat Secretion in Sudeck's Syndrome (Ueber Schweisssekretionsstoerungen beim Sudeckschen Syndrom). G. RODECK and G. MUSSGNUG. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 280: 97.

IN NEARLY ALL CASES of Sudeck's disease, the involved extremity has a moist smooth skin, cold and clammy to the touch. A functional disturbance of sweat secretion is obvious without special tests. The authors conducted experiments to measure this disturbance more precisely, using the iodine-starch method, in which a blue color is produced by moisture in starch sprinkled evenly on an extremity previously painted with a solution of iodine in glycerin. Tests were performed on more than 40 patients who had a full-blown Sudeck's syndrome, usually of the lower extremities, following fractures, dislocations, and soft tissue injuries. The report concerns only tests performed on the lower extremities. For unknown reasons repeated determinations of perspiration on the involved upper extremity did not yield interpretable results. The plaster bandages used early in the disease made it necessary to perform the studies only in the second stage of Sudeck's dystrophy.

When compared to the opposite limb, that portion of the lower extremity involved in Sudeck's dystrophy

gave evidence of definite hyperhidrosis in each case. The hyperhidrotic area did not usually coincide with areas of nerve distribution. More proximal areas of the skin were nearly always involved. Hyperhidrosis was especially marked in the immediate vicinity of fractures and about joints, regions in which dystrophic changes are likely to be more evident clinically and roentgenologically.

Figures 1, 2, and 3 are presented as typical of the results.

The findings are taken to indicate that in Sudeck's syndrome there is an irritation of the efferent sympathetic fibers resulting in the hypersecretion of sweat, and to some extent also an irritation of the afferent fibers. Spinal and supraspinal reflexes can then explain the distribution of the changes, and also the occasional contralateral involvement.

With the disappearance of clinical manifestations following successful treatment, the hyperhidrosis also disappears. In the atrophic end stages of Sudeck's syndrome, perspiration is normal in amount or even diminished. Persistence of hyperhidrosis indicates activity, and hence that therapeutic measures may still be beneficial. Hypersecretion of sweat is of limited use in predicting the onset of Sudeck's dystrophy since it lags behind the elevation of the skin temperature and other signs of the acute phase.

—Elmer V. Dahl, M.D.

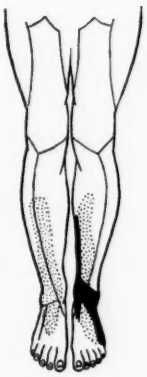

FIG. 1.

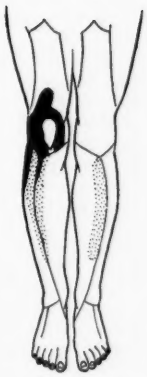

FIG. 2.

FIG. 3.

FIG. 1. (Rodeck, Mussgnug) Fracture of left medial malleolus and tibia near the ankle joint. The mild coloration on the right is essentially within the distribution of the peroneal nerve. The hyperhidrotic discoloration on the left extends into the region of distribution of the saphenous nerve.

FIG. 2. Fracture of lateral condyle of right tibia, with hyperhidrosis extending into the distribution of the peroneal and femoral nerves.

FIG. 3. Fracture of right metatarsals 1 to 3 and right lateral malleolus. The hyperhidrotic zone here involves nearly all of the region supplied by the saphenous and peroneal nerves.

Lipoma Destruens. J. H. ZAAIJER. *Arch. chir. Neerl.*, 1954, 6: 319.

THE TYPE of proliferation of adipose tissue which may endanger the patient by its localization or by the vulnerability of the organs affected is called lipoma destruens. Thus, lipoma destruens may be regarded as a formation of fat cells between the cells of other organs, endangering the functions of these organs by superseding the cell. It develops very slowly; symptoms do not appear until the organic function is disturbed, unless the swelling is visible or palpable at an early stage.

Two patients are described to illustrate the syndrome. One was an 11 year old boy who had a soft subcutaneous tumor in the right posterior axillary line. The tumor was grossly a lipoma; however, it was attached to the serratus anterior muscle, which had to be resected with the tumor.

The other patient was a 55 year old woman. The lipomatous tissue involved approximately 20 cm. of the distal ileum and produced stenosis of the lumen.

In both instances the picture was that of mature fat cells within the muscle replacing the muscle tissue. This pathologic picture is characteristic of lipoma destruens. *—Jerry A. Stirman, M.D.*

Squamous-Cell Skin Tumors of Benign Character; a New Clinical Form; Multiple Recurring Squamous-Cell Epitheliomas with Tendency to Spontaneous Cicatrization (Tumores cutáneos de estructura espinocelular y carácter benigno; Una nueva forma clínica; Epiteliomas espino-celulares múltiples y recidivantes con tendencia a la cicatrización espontánea). N. PUENTE DUANY. *Arch. cuban. cancer.*, 1954, 13: 327.

TWO INSTANCES of this condition, first described by Ferguson-Smith in 1934 (*Brit. J. Derm., Syph.*, 1934, 46: 267), both in native white Cubans, are reported. These 2 cases bring the total number of cases so far published up to 15. These 2 patients were, respectively, 52 and 42 years of age and came from entirely different regions of the island of Cuba. They were both in excellent general condition.

The tumors, for the most part, developed on areas of uninjured skin. A constitutional or immunological factor seemed to be present; at least, in the younger patient the tendency to healing of the lesions was greater. This latter patient showed a more pronounced tendency to the formation of chitinous masses and epithelial pearls, which are so characteristic of the squamous-cell tumors. This patient also failed to develop recurrences about the areas where the primary tumors had been removed by electrosurgery; and the medical measures, such as autoinoculations with the macerated and filtered tumor tissue and massive doses of the antibiotics(aureomycin), produced more marked regression of the lesions. Whatever the results of treatment, however, the lesions (just as in the other instances reported in the literature) tended to heal spontaneously if given enough time. This process of spontaneous cure of the individual lesion did not seem to act as a preventative to the formation of new lesions. In fact, neither of these 2 patients—the 52-year-old patient after a course of approximately 8 years and the 42-year-old patient after approximately 3 years—was entirely cured.

With regard to etiology, the author wonders about the possibility of the effects of solar radiation as a

cause. In both of his patients the lesions were limited to the face, hands, and forearms; in neither of the patients was there any lesion on the trunk, upper arms, or lower extremities. The behavior of the process in general suggested the possibility that some living agent (virus) might be responsible; however, no such agents could be discovered. A hypertrophic alteration was discovered histologically in the adjacent sudoriparous ducts; however, no such relationship could be discovered in connection with the hair follicles. Nevertheless the whole course of the process very much resembles that of the recurrent warts which are known to be of infectious origin.

—*John W. Brennan, M.D.*

Epithelioma Cuniculatum; a Variety of Squamous Carcinoma Peculiar to the Foot. IAN AIRD, H. DAINTREE JOHNSON, BERNARD LENNOX, and A. G. STANSFELD. *Brit. J. Surg.*, 1954, 42: 245.

THE AUTHORS describe 3 cases of a tumor of the fore part of the foot which can give rise to considerable difficulty in diagnosis. Clinically it is characterized by the presence of a soft bulky mass with extensive invasion of the soft tissues but little destruction of important structures, and by the presence of numerous sinuses exuding foul-smelling greasy material. Pathologically it consists of large and numerous anastomosing crypts lined by squamous epithelium and filled by breaking down keratin.

It is believed that this is a low grade squamous carcinoma, modified by extreme keratinization and the effects of pressure.

Amputation has been necessary in the authors' cases because of extensive local invasion. There have been no instances of metastases.

—*Ely Elliott Lazarus, M.D.*

Pediatric Surgery. WILLIS J. POTTS. *J. Am. M. Ass.*, 1955, 157: 627.

SPECIALIZATION in pediatric surgery has lagged far behind the trends in other fields. At the present time the surgical section of the American Academy of Pediatrics consists of only 33 men. Surgical diseases and surgical therapy are vastly different in the child and adult. Methods of diagnosis and treatment cannot be transposed from the adult to the child or infant.

Progress in pediatric surgery has been rapid in recent years, but knowledge of many of the advances has not filtered down to a large segment of the medical profession and public. The many advances and the challenge of unsolved problems justifies specialization in this field. The pediatric surgeon should have a special interest in children, sound training in general surgery, and additional training in pediatric surgery. His pediatric surgical training should include experience in diagnosis, fluid therapy, and postoperative care as well as operative manipulation. All of these are markedly different in the child.

Psychic preparation for surgery is perhaps more important in children than adults and is an integral part of preoperative care. Open administration of ether with supplementary oxygen is the method of choice in most procedures. Most of the recent innovations in adult anesthesia are not applicable to children, and anesthesiology of children is a challenging field. The operation itself must be conducted with greatest gentleness. The procedure must be suited to the disease in the child, and is not necessarily the same procedure for a similar condition in the adult.

With increasing awareness of the surgical problems in the very young, and with several medical centers offering good training, the children will be the real beneficiaries. —*Lockert B. Mason, M.D.*